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• **"What is** the biggest problem confronting the coal industry in 1937 and what should be done about it?" Last month Coal Age put this blunt question to a group of presidents of mining companies in various parts of the country. The answers of this group of coal-company executives to this question are summarized in the symposium of opinion which starts on page 59.

• **Mechanization** with shaker conveyors on 750-ft. faces is the latest step in the evolution of operating methods at the mine of the Macon County Coal Co. Opened in 1900 on the room-and-pillar system, a change to advancing longwall was made many years ago; the installation of shaker conveyors was a 1935-36 development. The Macon story will appear next month.

• **The picture** of developments in the coal-mining industry in 1936 was the most cheerful in several years. Bituminous production kept pace with general industrial recovery and anthracite hung up a better record than earlier surveys indicated. Prospects for further gains during the present year appear particularly bright. Salient factors in the picture are covered in the economic review on page 46.

• **Equally significant** is the fact that developments on the engineering front have not lagged behind production gains. More and more, as is clearly shown in the detailed feature articles in this issue, the industry is speeding up its drive to maintain its competitive position by improving the quality of its product and increasing the efficiency of its daily operations.

• **Spot news** should hold the center of the stage next month. Negotiations for a new wage agreement in the Appalachian region open in New York City Feb. 17. With the operators scheduled to report on how they think the Guffey bill should be written as this issue of Coal Age goes to press, February also should be a lively month on the legislative front.

• **On the** technical side of the calendar, March will carry the story of the annual midwinter sessions of the A.I.M.E. The program for the meeting has more than the usual number of topics which make a direct appeal to the coal-mining fraternity—and a group of Coal Age editors will be on hand to report the highlights of papers and discussions for our readers.

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COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

February 1937

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AUDIT AND FORECAST

NO high-powered telescope for piercing the murk of depression is needed to pick out the bright spots in the picture of the coal-mining industry for the year just recently closed. While, naturally, the rate of advance varies, progress is clearly discernible in every phase of operation. Production is up; underground mechanization has registered further marked gains; mechanical cleaning looms large in preparation-plant installation records; fatality rates promise to hit a new low.

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Bituminous output in 1936 again was closely synchronized with the indices of general industrial activity and roughly approximated 80 per cent of the 1929 level. Barring major upsets, predictions of a production of 473,000,000 tons during the current calendar year do not appear overoptimistic, and an early return to the half-billion mark seems less of a mirage than it did as late as 1935. Competitive costs will be the speedometer.

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Production of legitimately mined anthracite, too, topped 1935 figures by a slight margin. Anthracite's fight to regain lost markets has been characterized by a steady shrinkage in average mine realizations; values, as reported by the U. S. Bureau of Mines, have dropped from $5.63 per ton on breaker shipments in 1929 to $4.29 in 1935. And the end is not yet in sight because the industry is keenly conscious of the necessity for competitive price levels.

Anthracite producers also must face the problem of absorbing higher basic wage rates this spring and the still uninterrupted activities of the bootleg miner. Establishment of the seven-hour day should further intensify mechanization developments in the hard-coal region. So long, however, as the local government continues to openly condone wholesale thievery, legitimate operators must look to outraged public opinion in other States for the protection Pennsylvania denies.

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Labor and government relations are the immediate outstanding problems on the bituminous side of the industry. The best interests of organized labor and of the operators both demand a speedy and amicable negotiation of a new wage contract on bases fair to management, the worker and the consumer. If this is done, the industry and its allies can push forward confidently regardless of what fate may befall regulatory proposals now before Congress.

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This is said with full recognition of the benefits which might flow from a sane law and of the possibilities for confusion and worse in attempting the impossible or the undesirable. But sound and substantial progress must rest primarily on internal action, initiative and vision. Wise and courageous management may be counted upon to consolidate the gains already made and to press on to still greater achievements in 1937.

COAL INDUSTRY

+ Presses Forward on Economic Front

A MILD BOOM in production in response to increased industrial activity was an outstanding feature of economic developments in the bituminous industry in 1936. But while the return of the 10,000,000-ton week and progress in research, promotion and utilization did much to ease the depression strain, it still left coal men faced with a number of important problems, including transportation charges, competitive fuels and sources of energy, and government regulation.

As in 1935, the bituminous industry operated part of last year under federal control. This control, however, hardly got beyond the theoretical status, as the most important phases of operation under the Bituminous Coal Conservation Act of 1935 were still in the preliminary stages when the hours, wages and price-fixing provisions of the act were invalidated by the United States Supreme Court on May 18, leaving the measure only a skeleton of its former self and ending the second attempt at government regulation since Oct. 2, 1933.

Substitute legislation introduced on May 20 met with threats of a Senate filibuster in the closing days of the 74th Congress and consequently was jettisoned to make way for adjournment on June 20. Failure to pass the proposed Guffey-Vinson measure did not, however, end the question of federal legislation for bituminous coal, and the closing days of 1936 found members of Congress, the United Mine Workers and operators preparing for a new trial of strength in the 75th session, which got under way Jan. 6, 1937.

Total bituminous output, according to preliminary estimates by the U. S. Bureau of Mines, was 431,950,000 tons in 1936, an increase of 62,626,000 tons, or 17 per cent, over the 1935 production of 369,324,000 tons. Prices were marked by a relatively high degree of stability in 1936. Indications point to little change in stocks of bituminous coal held by consumers as between Jan. 1, 1936, and Jan. 1, 1937. Lake shipments, however, broke the previous record made in 1929 by rising to a total (cargo and fuel) of 45,440,696 tons, an increase of 9,603,246 tons, or 26.8 per cent, over 1935. Railroad coal consumption (Fig. 5) rose about 9,500,000 tons, or 13.4 per cent. Electric-power-utility consumption increased approximately 6,700,000 tons, or 19.2 per cent. Figures for both railroads and utilities include, of course, a certain proportion of anthracite. Coal used in the manufacture of pig iron went up approximately 15,000,000 tons, or 49.2 per cent, last year. In the same period, consumption by steel and rolling mills, coal-gas retorts, cement mills and "other industrials" rose about 21,000,000 tons, or 19.2 per cent.

Output to Rise in 1937

An increase of between 9 and 10 per cent in bituminous output in 1937 is forecast by D. P. Morton, chief rating commissioner, Chesapeake & Ohio Ry. Co. This increase is based on a "reasonable advance estimate of the general business level (taking into account seasonal fluctuations)" in 1937, which, in the opinion of economists, "will be well above that of 1936."

The level of bituminous coal production, Mr. Morton pointed out in an analysis of bituminous producing capacity and the outlook for the industry in the January issue of *Coal Age*, pp. 17-20, follows closely the level of general business, as measured by the Leonard P. Ayres index of activity. From an advance estimate of the business index, therefore, it is possible to estimate probable bituminous production.

Such an advance estimate shows for the first quarter of 1937 an index of 87; second quarter, 93; third quarter, 95.5; fourth quarter, 94.5. Corresponding production estimates are: first quarter, 124,592,000 tons; second, 98,633,000 tons; third, 117,283,000 tons; fourth, 132,707,000 tons; estimated 1937 total, 473,215,000 tons. For 1936, the advance estimate was 433,297,000 tons.

"To the busy sales or operating executive, this suggestion may be timely," Mr. Morton concludes. "Your pro-rata share of the national coal business can be determined readily by calculating your percentage of that business, quarterly, for 1935 and 1936. Set your production and sales quotas for 1937 on these calculated percentages of the 1937 quarterly estimates of the United States production given above, but be sure to check your daily capacity to produce against the available working time in each quarter. Many producers probably will find that the present capacity of their mines on the five-day-week basis is insufficient to meet their 1937 calculated quota."

Pennsylvania anthracite ended 1936 with a 5 per cent increase in output. Excluding 4,000,000 tons or more of stolen coal, total legitimate output is estimated at 54,760,000 tons in 1936, an increase of 2,601,000 tons, or 5 per cent, over the 1935 total of 52,159,000 tons. Competitive fuels continued to exert heavy pressure on consumers and potential consumers of anthracite, which was met, however, by the formation of a new organization to undertake an industry-supported advertising and promotional campaign in the Eastern anthracite-burning territory. The stolen-coal problem continued to harass the industry, particularly in the Southern field, and while, as a result of publicity and missionary work, some progress was made by the constituted authorities in certain consuming centers in halting the inflow of "hot" coal, little was accomplished in stopping production from outlaw pits, largely due to the hands-

off policy of local and State law-enforcement agencies.

Another feature of 1936 anthracite developments was the adoption of a new wage and working agreement to extend to April 1, 1938. Negotiations got under way Feb. 24 and as a result of a deadlock the conference took the unprecedented step (for anthracite) of voting, on March 25, to extend the previous agreement from March 31 to April 30, with provisions for a further extension in case an agreement was not reached by that time. Continued failure to agree brought a refusal of further extension from the miners' representatives late in April, which speeded up the last stages of the negotiations, although the final meeting of the minds did not take place until May 8. In addition to complete check-off of union dues, a clause providing that United Mine Workers' officials assume complete responsibility for prevention of illegal strikes and improvement of discipline for contract violations, and provision for a modified equalization of working time, the new contract granted the miners a seven-hour day and a five-day week beginning May 1, 1937, contract rates to remain the same and hourly, daily, monthly and consideration rates to continue at the same level for seven hours' work as for eight hours. The operators, however, were granted the right to work men overtime in case of emergency and also to work men at any operation six days a week in any twelve weeks in a contract year.

Ask Ban on Coal Theft

A bid for State assistance in curbing the theft of coal was made by an anthracite operators' committee early in the year. This committee called on Governor Earle of Pennsylvania on Feb. 4 and were informed by the Governor that State police would not be sent into the affected region until local authorities certified that the situation was out of hand. One result of the conference was that a number of operators announced their intention of appealing to county sheriffs as the first step in another campaign eventually winding up again at the Capitol. Another result was a campaign by the outlaw miners to strengthen their associations and enlist at least passive, if not active, support of the citizens and authorities in the mining regions.

Left virtually powerless in the mining region by the attitude of State and local authorties, operators continued efforts to enlist support in consuming areas. Meanwhile, the outlaw miners continued to perfect their protective organizations while a new participant in the movement of stolen coal from pit to market—the operator of the outlaw breaker—entered the picture in increasing numbers. Contracting for the output of a number of pits, the outlaw breaker operator is in position to prepare the coal better and also to offer better loading facilities and a more regular source of supply to the outlaw trucker.

But while little progress was made in the mining regions, efforts to arouse retailers, civic organizations and local authorities in consuming regions began to meet success in the last half of 1936. On Aug. 11, a truck driver in Philadelphia was given the choice of a fine or jail sentence on charges of obtaining money under false pretenses and giving short weight. A few days previously, on Aug. 7, ten drivers of alleged stolen-coal trucks and two dealers, charged with receiving stolen goods, were arrested in New York City. Subsequently, a grand jury investigation into stolen-coal traffic into New York was begun on Aug. 18. Two dealers were indicted on Aug. 27, and on Sept. 16 the jury, in presenting its findings, scathingly censured authorities in Pennsylvania for permitting "polluted commerce."

As the next step in getting the facts before the public, operators invited reporters on a trip through bootleg regions in the Southern field in November, which resulted in widespread publicity in newspapers and popular magazines. Early in the same month (Nov. 4) another blow was struck against the stolen-coal traffic into New York City when a truckman, one of 23 seized on a transportation charge, paid $25 in the Court of Special Sessions rather than spend ten days in the Tombs. Similar penalties were proposed for the others when their cases were called, but prosecuting authorities stated that future arrests would bring requests for penitentiary sentences. Two days later, Magistrate Aurelio, in Tombs Court, held two truck drivers for the grand jury on charges of transporting stolen coal. New York authorities were continuing their campaign of arrests at the end of the year.

Finally, on Dec. 20-22, Governor Earle paid a visit of investigation to the Southern field in the course of which he again refused to send in State police, reiterated a previous statement that federal operation or control of the industry was possibly the way out of the situation and finally announced his intention of requesting the appointment of a commission to study stealing of coal and propose a remedy or remedies. In line with this announcement, the Governor, in his message to the Pennsylvania Legislature on Jan. 5, 1937, requested authority to name such a commission. An enabling bill, providing for a five-member commission, was introduced by Representative John Stank, of Northumberland County. In his message, the Governor also urged consideration of the "feasibility of including under public-utility regulation all natural and manufactured gas, gasoline and oil and possibly coal."

Anthracite Organizes

To supplement the general publicity work of the Anthracite Institute, the equipment testing and development work of the Anthracite Institute Laboratory and the research and sales promotion work of individual producers, hard-coal producing and selling interests organized a new agency in June—Anthracite Industries, Inc.—to direct a mass appeal to consumers in the anthracite-burning territory and to act as a liaison agent between producers, retailers, equipment manufacturers and distributors, and consumers.

Even though only a little over six months old at the end of 1936, the new agency was credited with substantial progress in curbing the onset of competitive fuels, and in fact emphasis on the convenience and economy aspects of fuel-burning equipment now available were made a major item in the Anthracite Industries program from the start. The work of this new agency is discussed in further detail in the article beginning on p. 57 of this issue. Anthracite also received substantial benefits from the increased sales of stokers in 1936 and continued its efforts to perfect existing units and develop new types. One evidence of this trend was the granting of patents on two coal-burning devices to the Anthracite Institute Laboratory in May. One patent covered a furnace embodying a new principle of combustion under which all waste space over the fire bed is eliminated, and the other covered a mechanical stoker and ash conveyor designed to take coal directly from the storage bin, burn it in an improved firepot and remove the ashes to any convenient point, even outside the house.

In the bituminous industry, a renewed attempt at federal regulation perished before the year was half over. Taking the torch from the administrators of the NRA bituminous coal code (Oct. 2, 1933—May 27, 1935) the National Bituminous Coal Commission, organized under the provision of the Bituminous Coal Conservation Act of 1935, signed by the President on Aug. 30 of that year, perfected its organization in the last months of 1935 and, in spite of a multitude of court attacks, started 1936 with a determined effort to secure establishment of minimum-price schedules in the large and important Area 1. Between Aug. 30, 1935, and Jan. 1, 1936, the code provided in the act was promulgated, organization of district boards was completed in all but District 21 (North and South Dakota), statistical boards were set up in all but Districts 18 (New Mexico) and 21, preliminary hearings on classifying and limiting sizes and on establishment of minimum-price schedules in Minimum-Price Area No. 1 were held, minimum prices were approved for Districts 14, 16, 17 and 18 (Arkansas-Oklahoma, northern Colorado, southern Colorado, and New Mexico), and other ground was cleared. By the end of 1935, 3,685 companies with a 1934 output of 252,000,000 tons had signified acceptance of the code.

Legal Actions Start

All was not smooth sailing, however, as the ink was hardly dry on the President's signature before James Walter Carter, president, Carter Coal Co., brought suit to prevent his company from becoming a code member and thus fired the opening gun in a widespread legal campaign against the act itself, supplemented by additional suits by many companies designed to prevent collection of the tax included in the act, pending final ruling on its constitutionality. The extent of legal actions of the latter character was evidenced by an announcement by the Bureau of Internal Revenue that about 75 per cent of the taxes due up to Jan. 1, 1936, had been impounded by the courts. On Dec. 23, 1935, in response to representations by counsel for the government, Mr. Carter and the R. C. Tway and other Harlan County (Ky.) companies, the Supreme Court agreed to a quick test of the validity of the act, thus obviating recourse to the appellate courts in the Carter and Tway cases.

With the developments briefly sketched in the two paragraphs above as a background, the first major event in regulation in 1936, as noted above, was the exertion of pressure for establishment of minimum price schedules in Area 1, together with standards of coal classification and rules and regulations governing sale and distribution of coal and coordination of minimum prices. Also, the Commission prepared to hold hearings on proposed minimum prices for Utah and Wyoming. Coordination proved the principal stumbling block in Area 1, proceedings in January and February revealing not only disagreements between districts in Area 1 but also between operators within individual districts.

Regulation is Upset

The validity of the Bituminous Coal Conservation Act of 1935 was argued before the Supreme Court on March 11 and 12, 1936. Seven States (New Mexico, Indiana, Illinois, Kentucky, Pennsylvania, Ohio and Washington) and 612 companies, members of the code, filed briefs favoring the act. Attackers were joined by 66 operators who were opposing the law through injunction proceedings in the lower courts. The efforts of those favoring the act proved unavailing, however, when a majority of the court on May 18 declared the 15-per-cent tax on non-code members a penalty; reiterated previous conclusions that mining is not interstate commerce and consequently ruled the regulation of wages and hours prescribed in the act was beyond the power of Congress, in addition to representing an illegal delegation of authority; and found the code price-fixing provisions to be so bound up with the labor provisions as to be inseparable and consequently also invalid.

Repercussions of the decision had hardly died away when Representative Vinson (Kentucky) and Senator Guffey (Pennsylvania) introduced substitute legislation in the House and Senate on May 20. The new bills eliminated the labor provisions of the previous act but retained in substantially the same form the 15-per-cent tax and the price-fixing, marketing and fair-practice provisions. Proponents and opponents lined up substantially as before, and on June 16 an amended version of the Vinson bill was passed by the House. In the Senate, however, the Guffey counterpart ran into threats of a filibuster by Senator Holt, of West Virginia, and was allowed to die to make possible adjournment on June 20.

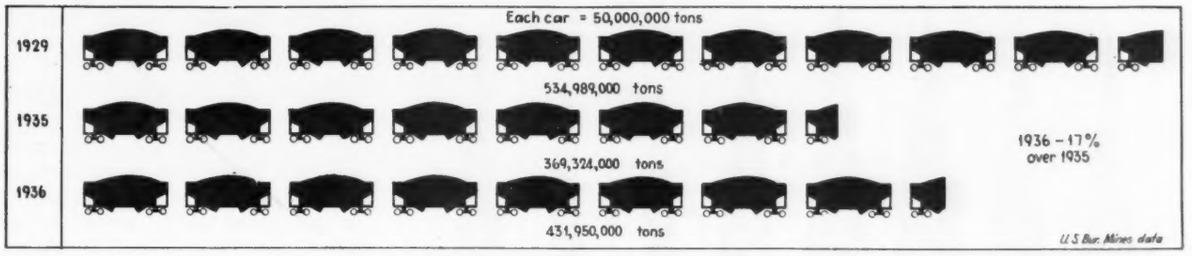


Fig. 1—Bituminous production increases 17 per cent in 1936

As a result of the Supreme Court decision, district sales agencies took on a new lease of life. Appalachian Coals, Inc., which had previously made tentative plans to expand its work, immediately swung into action, and Alabama Coals, Inc., took action the day after the decision to steady the economic situation and forestall any threat to the State wage structure. Interest in the possibilities of agencies in western Pennsylvania, northern West Virginia, Indiana and other regions was revived, although it did not reach the stage of actual organization.

Federal regulation, however, while temporarily in abeyance, was not counted out of the picture, and in December of last year operators from producing districts east of the Mississippi River, following out their belief that legislation affecting the bituminous industry inevitably would be considered in the 75th Congress, met in New York City on Dec. 4 and 16-17 to name a committee to frame a regulatory measure. Committee sessions were held at White Sulphur Springs, W. Va., Dec. 29-30, in the course of which a sub-committee was appointed to iron out differences in cost-determination plans submitted as bases for establishing minimum prices.

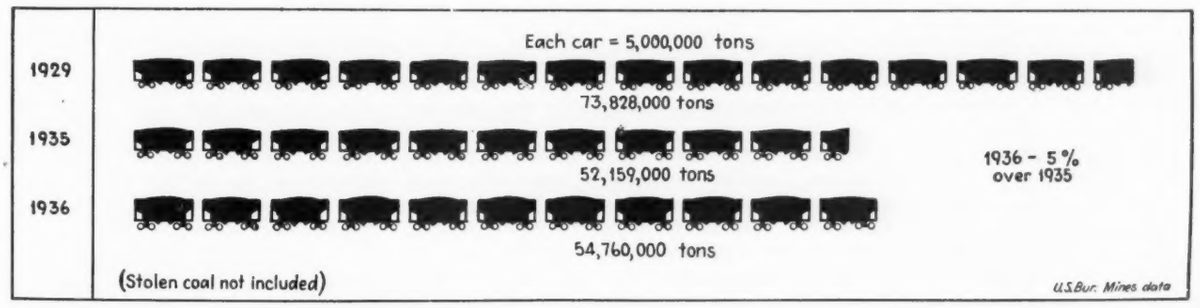
Continuance of operator discussions failed to deter Representative Vinson and Senator Guffey. A new Guffey bill (S. 1) was offered in the Senate by the latter on Jan. 6, 1937. The companion bill offered by Mr. Vinson in the House bears the number H.R. 2015. Provisions of the new measure are substantially similar to those of the previous bill offered by the same men in the closing weeks of the 74th Congress. Commission membership, however, is raised to seven and in place of the previous labor provisions substantially the Walsh-Healey provisions have been written into the proposed measure. Lignite is exempted.

As in past years, relations between bituminous coal and substitute fuels and sources of energy were marked by a further gain in substitute activity paralleled by a strengthening of measures for defending or winning back markets by the coal industry. These measures included: revision of operating methods and equipment to reduce cost and improve product (reviewed in the appropriate articles elsewhere in this issue); studies of buying habits and assistance to consumers in the selection and use of coals; research to develop improved methods of utilizing coal and explore possible new markets; promotion of the use of modern coal-burning equipment; improvement in relations between coal producers, wholesalers and dealers, organizations interested in the manufacture, sale, installation and servicing of equipment and the purchaser—prospective or actual—of solid fuel or equipment; and development of a better understanding of the problems of the coal industry, particularly from the standpoint of regulation and relations with competitive fuels and sources of energy, among the general public and legislative and governmental bodies. Establishment of freight rates more nearly in line with market conditions was another objective of coal men, including the anthracite group, in 1936.

In addition to individual soft-coal operators, attainment of the various objectives enumerated above was actively sought by a wide variety of associations and organizations, such as the National Coal Association and local operators' associations; sales agencies, such as Appalachian Coals, Inc., Alabama Coals, Inc., Northern Colorado Coals, Inc., and others; Bituminous Coal Research, Inc., and other research agencies; coordinating bodies, such as the Committee of Ten—Coal and Heating Industries; public-relations groups, either jointly organized by operators, miners and affiliated interests, of which the National Job Saving and Investment Protection Bureau for the Coal Industry is an example, or by citizens in coal-producing regions, such as the Illinois Reciprocal Trade Association; and other special groups.

On the basis of eleven months' figures by the Bureau of Mines, a record total consumption of 405,000,000 bbl. of gas and fuel oil is estimated for 1936. Consumption in 1935 was 366,000,000 bbl., including heating oil, 76,853,000 bbl.; railroads, for all purposes, 55,651,000 bbl.; bunkering, 74,581,000 bbl.; gas and electric-power plants, 23,647,000 bbl. With fuel uses as the outlet for about 39 per cent of the crude output, second only to 44 per cent used for

Fig. 2—Anthracite registers a 5-per-cent gain in 1936



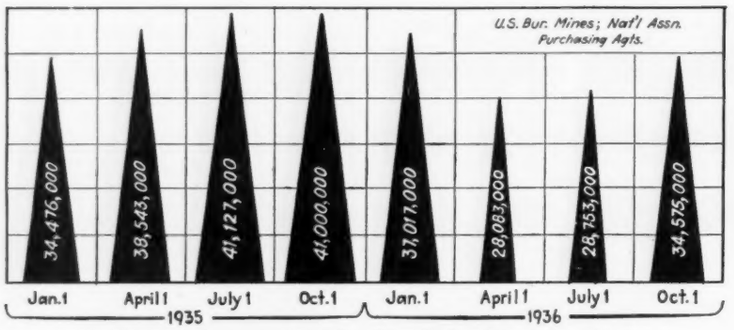


Fig. 3—Consumers' stocks show little change in 1936

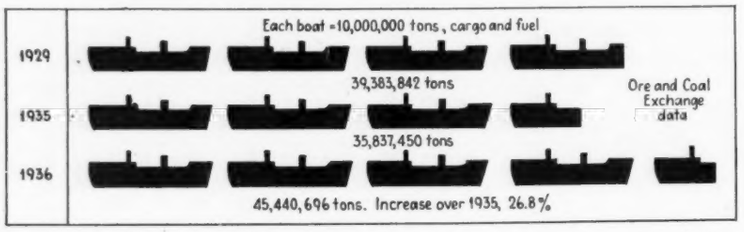


Fig. 4—Lake-cargo dumpings (cargo and fuel) break the 1929 high

gasoline and motor fuels, the growing use of heating oils was credited with eliminating much of the seasonal decline in the oil industry in the fall and winter months.

Shipments of oil burners of all types, according to reports to the Bureau of the Census, rose approximately 40 per cent in 1936 (Fig. 6). Consumption of oil for engine fuel by railroads (Fig. 5) rose about 21 per cent, against 13.4 per cent for coal, while electric-utility fuel-oil consumption registered a gain of 24.6 per cent, compared with a rise of 19.2 per cent in coal use.

Natural-gas consumption, on the basis of sales reported to the American Gas Association, increased approximately 16 per cent in 1936. The largest item was a rise of about 21 per cent in industrial sales. Commercial sales, a relatively small classification, rose about 16 per cent, while domestic and house-heating sales, second largest gas outlet, increased approximately 6 per cent. Apparently one factor in the industrial increase reported by the American Gas Association was a rise of 24.2 per cent in electric-utility consumption.

In addition to moving into important consuming centers heretofore held primarily by coal, natural-gas distributing companies laid plans for taking over additional industrial and domestic consumers in major coal-marketing areas in 1937. Michigan was the scene of a major expansion program in 1936, with, in addition to smaller developments, the installation of a gas line from near-by fields to serve Grand Rapids with a 50:50 mixture of natural and manufactured gas, and the construction of a lateral from Zionsville, Ind., to Detroit to serve the latter city with Texas gas through the Panhandle Eastern Pipe Line Co. system. The latter company at the end of the year reported the prospect of sufficient additional connections in southern Michigan, Missouri, Illinois and Indiana, in addition to western sections of Columbia Gas & Electric territory, to warrant duplicating its present system in its entirety in the next few years.

On Nov. 29, in accordance with State laws, the Columbia Gas & Electric Co. and affiliated interests started to advertise throughout southeastern Pennsylvania a proposal to petition the Governor for permission to incorporate the Pennsylvania Gas Transmission Corporation to supply natural gas to the area. On the same date, the United Gas Improvement interests filed with the Pennsylvania Public Service Commission a proposed schedule of therm rates for natural-gas service to Harrisburg, Lebanon, Reading, Allentown, Bethlehem and adjacent communities, the gas to be obtained from connection with the Columbia system. Under the proposed plan, it was reported, the entire output of the 20-in. 420-mile Kentucky-Pennsylvania line would be under contract for fifteen years.

Eventual expansion of natural-gas service to western New York was foreshadowed on Dec. 29, when the New York Public Service Commission confirmed its Sept. 24 decision to permit the Cabot Gas Corporation to build a 14-in. 92-mile line from northern Pennsylvania to the city limits of Rochester to supply the Pavilion Gas Co., industries in the vicinity of Rochester and domestic consumers along the proposed line.

On the coal side, developments in 1936 were marked by a material increase in sales of stoker and pulverized-coal-firing units. Small stokers were in the van of the upsurge, installations of Class 1 and 2 units (domestic and small commercial heating services) rising to an estimated total of 80,500 in 1936, an increase of about 82 per cent over the 1935 total of 44,288 units and 423 per cent over the 1933 figure of 15,418 units. Among the factors responsible for this increase were increasing appreciation by consumers of the possibilities of coal-burning equipment of this type and a closer approach to automatic operation in late-type models, many of them equipped with bin feeders, automatic air controllers and fire-holding devices.

Sales of Class 3 and 4 stokers (large commercial and industrial services) also registered an increase of approximately 42 per cent from the 1935 figure of 3,638 units to the estimate of 5,175 in 1936. Sales of all four classes of stokers in 1936 were 72 per cent above 1935 and 371 per cent above 1933. In comparison, shipments of all classes of oil burners in 1936 (Fig. 6) were only 40 per cent over 1935 and only 122 per cent over 1933. New orders placed for pulverized-fuel installations in the first eleven months of 1936 totaled 347, according to the Bureau of the Census, against 236 in 1935, 134 in 1934 and 153 in 1933. Capacity of the 1936 units is 2,998,100 lb. of coal per hour, against 1,261,160 tons in 1935, 639,480 tons in 1934 and 977,590 tons in 1933.

Stokers Made Wide Gains

Although early accepted as a competitive weapon, the small stoker has since moved more and more into the foreground of coal-industry thinking. This increased importance in the minds of bituminous operators and organizations was evidenced in 1936 by such developments as the holding of a stoker symposium by the fuel-engineering division of Appalachian Coals, Inc., on Jan. 6, operator sponsorship of and participation in stoker exhibits, such as that of the Birmingham (Ala.) Junior Chamber of Commerce set up late in the year with the assistance of the Alabama Mining Institute, the selection of certain problems in the application of coals to stokers as one of the first

tasks of Bituminous Coal Research, Inc., and the establishment of an engineering department by the National Coal Association late in the year to promote coal utilization.

Bulletins on "The Relation of the Size of Bituminous Coals to Their Performance in Small Underfeed Stokers" and on "Clinker Formation in Small Underfeed Stokers" were issued by Bituminous Coal Research on Jan. 24. Late in the year, the organization released Technical Report No. 3 on "Efficiencies and Costs of Various Fuels in Domestic Heating," the data for which, as well as the previous bulletins, were gathered by members of the staff of Battelle Memorial Institute. In August, the research organization decided to make its laboratory available to coal producers and stoker manufacturers for the study of individual problems which had been excluded from its general program.

Hydrogenation research sponsored by Bituminous Coal Research, Inc., and carried on at Pennsylvania State College was expanded early in 1936 by addition of State funds to the budget. The problem of producing gasoline by hydrogenation of coal was attacked by the Bureau of Mines in the last half of the year with the erection of an experimental plant at Pittsburgh to explore possibilities against future large-scale adoption of this method of producing motor fuel. A complete summary of coal-research projects is given on p. 81.

Packaged Fuel Gains

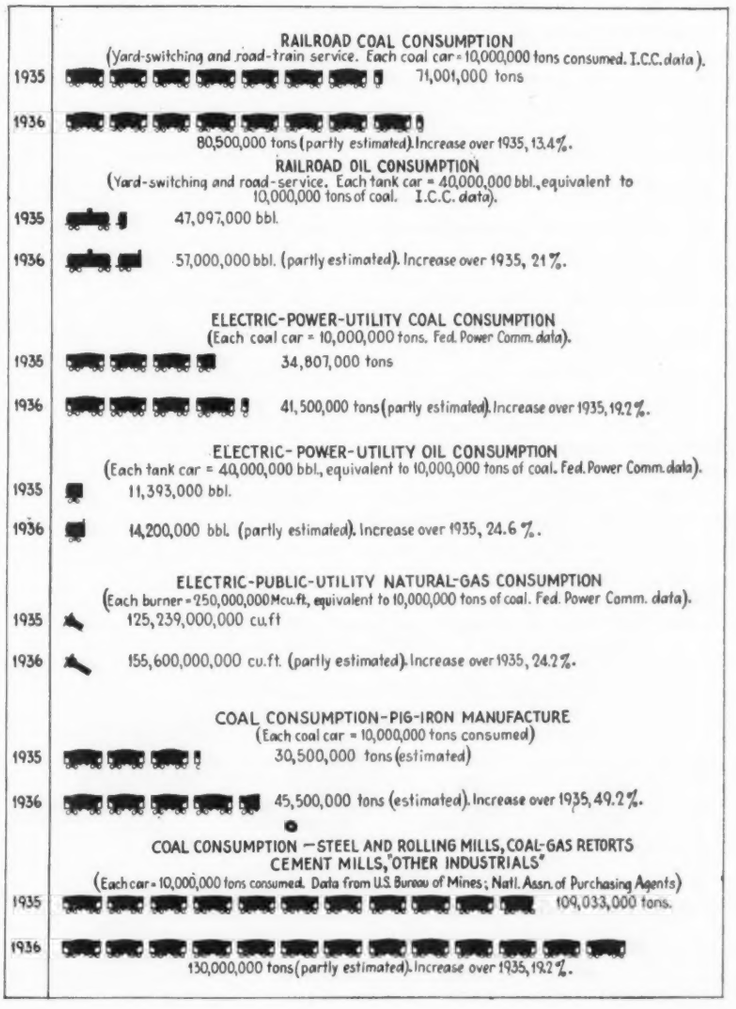
Along with another rise in briquetting as a means of increasing the convenience aspect of coal use and at the same time as a means of converting fines into a higher-priced product was a substantial rise in the production of packaged fuel, particularly that type consisting of screenings pressed into blocks with a glucose binder and then wrapped in paper for ease and cleanliness in handling. Preparation of the latter type of fuel, using the Eberling packaged-fuel machine, had its inception in 1932 and since has spread widely in consuming territories, particularly in the East and Middle West. A major factor in this spread has been sponsorship by two large producers of West Virginia low-volatile coal, first the Pocahontas Fuel Co. and later the White Oak Coal Co., sales agent for the New River Co. and affiliates.

The year 1936 also brought out another type of packaged fuel the size of ordinary clay bricks. This fuel was an Illinois development and is produced by a concern at Collinsville, Ill., using a converted brick kiln and a formula of the University of Illinois designed to yield a smokeless product. The bricks are waxed-paper-wrapped and are packed in cardboard containers.

Another factor influencing market prospects in the immediate future was elimination of the so-called emergency freight charges beginning Jan. 1, 1937. These charges originally were scheduled to expire June 30, but were extended by the Interstate Commerce Commission in a ruling made public June 13. At the same time, the Commission reduced the maximum surcharge on coal from 15 to 10c. per ton. Railroads soon after began consideration of ways and means of securing either permanent continuance of the charges or of rate increases to take their place, and on Oct. 22 requested the Commission to temporarily suspend past rate decisions to permit consideration of the increases asked by the carriers. This request was granted on Oct. 23, and following consideration of replies to the adjustment proposal the Commission denied it on Nov. 19. At the same time, however, the Commission ruled that the carriers had a right to be heard as to the lawfulness and propriety of the basic rates proposed to be increased and consequently reopened the surcharge case. Representatives of the railroads started presenting testimony in favor of their request on Jan. 6, 1937.

Continued opposition marked the industry's attitude toward government-financed competition in the power and energy field. Included in the projects objected to by the industry as unsound economically in addition to their likelihood of increasing unemployment was the proposed Mississippi Valley Authority and other hydro projects similar to the Tennessee Valley Authority offered

Fig. 5—Coal consumption rises in 1936, but not as fast in certain industries as oil and gas


RAILROAD COAL CONSUMPTION
(Yard-switching and road-train service. Each coal car = 10,000,000 tons consumed. I.C.C. data).
1935
71,001,000 tons
1936
80,500,000 tons (partly estimated). Increase over 1935, 13.4%.
RAILROAD OIL CONSUMPTION
(Yard-switching and road-service. Each tank car = 40,000,000 bbl., equivalent to 10,000,000 tons of coal. I.C.C. data).
1935
47,097,000 bbl.
1936
57,000,000 bbl. (partly estimated). Increase over 1935, 21%.
ELECTRIC-POWER-UTILITY COAL CONSUMPTION
(Each coal car = 10,000,000 tons. Fed. Power Comm. data).
1935
34,807,000 tons
1936
41,500,000 tons (partly estimated). Increase over 1935, 19.2%.
ELECTRIC-POWER-UTILITY OIL CONSUMPTION
(Each tank car = 40,000,000 bbl., equivalent to 10,000,000 tons of coal. Fed. Power Comm. data).
1935
11,393,000 bbl.
1936
14,200,000 bbl. (partly estimated). Increase over 1935, 24.6%.
ELECTRIC-PUBLIC-UTILITY NATURAL-GAS CONSUMPTION
(Each burner = 250,000,000 Mcu.ft, equivalent to 10,000,000 tons of coal. Fed. Power Comm. data).
1935
125,239,000,000 cu.ft
1936
155,600,000,000 cu.ft. (partly estimated). Increase over 1935, 24.2%.
COAL CONSUMPTION—PIG-IRON MANUFACTURE
(Each coal car = 10,000,000 tons consumed)
1935
30,500,000 tons (estimated)
1936
45,500,000 tons (estimated). Increase over 1935, 49.2%.
COAL CONSUMPTION—STEEL AND ROLLING MILLS, COAL-GAS RETORTS CEMENT MILLS, "OTHER INDUSTRIALS"
(Each car = 10,000,000 tons consumed. Data from U.S. Bureau of Mines; Natl. Assn. of Purchasing Agents)
1935
109,033,000 tons.
1936
130,000,000 tons (partly estimated). Increase over 1935, 19.2%.

during the year. The bill proposing MVA was offered in the 74th Congress by Senator Norris, but was never acted upon, although hearings were held at which coal-industry representatives appeared in opposition.

Representatives of the coal and allied industries also were active in opposing other projects involving direct expenditures by government departments or agencies or grants or loans of money for power-generating facilities involving hydro, oil or natural-gas power, or for construction of distribution systems for competitive fuels, primarily natural gas. Aroused by reports that $300,000 in PWA funds would be expended in building a natural-gas line from Jackson to Vicksburg, Miss., the Alabama Mining Institute carried the fight to its representatives in Congress, requesting them, on Feb. 27, to oppose further gas inroads.

While coal and ice men in Tennessee were the first to take the field against TVA in June, 1934, the conduct of legal campaigns against this agency and the government power program reverted to the public utilities in 1936. TVA won a victory of sorts early in the year, when the Supreme Court by a vote of 8 to 1 upheld the right of the Authority to sell power generated at Wilson Dam in a decision confined to the validity of a contract for the sale of power-transmission lines of the Alabama Power Co. to TVA. The question of the right of the government to acquire or operate local or urban distribution systems was not at issue, the court ruled. The suit was brought by preferred stockholders of the Alabama Power Co. and was decided against the government in the lower court at Birmingham, Ala., on Feb. 22, 1935. This decision was reversed in the court of appeals at New Orleans July 17, 1935.

A joint attack on the constitutionality of the TVA act and operations under it was launched on May 29, 1936, with the filing of suits identical in important details in the Federal District Court at Birmingham, Ala., and in the Chancery Court of Tennessee, Knoxville, by nineteen public-utility companies. A petition by TVA to transfer the Knoxville action to the U. S. District Court for the Middle Tennessee District was granted June 15. Right of the power companies to attack the TVA program in its entirety was affirmed by the latter court on Nov. 7. On Dec. 12, the same court granted a temporary injunction restraining TVA from building new transmission lines and substations, or from serving any new customers, except in restricted rural areas, pending further court orders or trial of the suit. On Jan. 8, 1937, TVA counsel petitioned the Sixth U. S. Circuit Court of Appeals, Cincinnati, for an order setting aside the injunction, alleging the judge in the lower court lacked jurisdiction in the case and on other grounds.

While the major action was going forward, utilities individually were attacking local TVA power programs through the medium of injunction proceedings. As examples, the Alabama Power Co. on July 18 filed an action in the Cullman County (Ala.) Circuit Court against the Cullman County Electric Membership Corporation to restrain it from engaging in the electric public utility business; the Tennessee Electric Power Co., in August, obtained a temporary order restraining sale of bonds for or any move to begin a municipal power distribution plant by the city of Chattanooga or the Chattanooga Public Power Board; and the Georgia Power Co., on Jan. 2, 1937, lost a suit for an injunction to stop the North Georgia Electric Membership Corporation from purchasing and distributing TVA power.

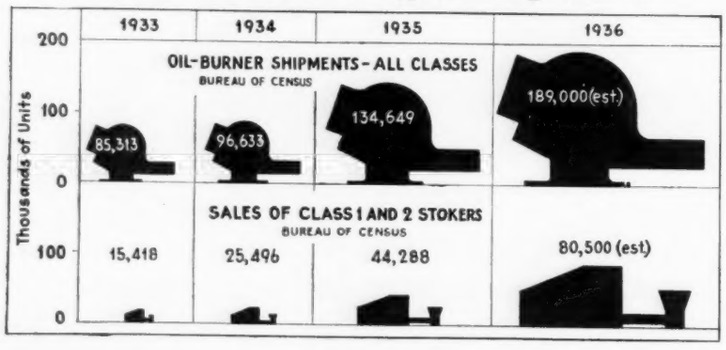
In addition to the drive against TVA and its outlets, nation-wide attacks on the PWA power-plant program were made by public utility companies, with the result that 51 such projects were in litigation at the end of the year, while one suit, that of the Duke Power Co. against a hydro-electric project of the South Carolina Public Service Authority on the Santee Cooper River, reached the Supreme Court late in 1936 and was remanded back for retrial.

One government project offering the possibility of some aid to coal—extension of rural electric lines, suggested by the National Job Saving and Investment Protection Bureau in 1934—was actively prosecuted in 1936. As a result, the Rural Electrification Administration, by Dec. 7, had allotted sufficient funds to construct 38,513 miles of lines serving 136,659 customers. Utilities also strengthened their rural-electrification program in 1936, and the utilities and REA, it is forecast, will build together 36,000 miles of line serving 160,000 customers in 1937.

With no changes in hours or rates, bituminous labor relations were characterized by a high degree of stability in 1936. Number of men employed, it is estimated, showed a slight increase. In Illinois, the Progressive Miners of America received still further setbacks in 1936. On Jan. 21, the insurgent union was permanently restrained from interfering with the operation of the Red Ray No. 13 mine of the United Electric Coal Cos., Freeburg, and on March 2 the U. S. Supreme Court refused the union a review. A strike of Progressives in Saline County in opposition to the opening of No. 43 mine of the Peabody Coal Co. with members of the United Mine Workers lasted two days from March 5. In August, the United Electric Coal Cos. sued the Progressives for $400,000 damages growing out of interference with Red Ray operations, and on Dec. 16, as a result of federal investigations into railroad bombings in Illinois, indictments were returned against 41 persons, including William Keck, Progressive president, and a number of other insurgent members.

In preparation for negotiations for a new Appalachian agreement to replace the present contract expiring March 31, 1937, operators and miners began to prepare their proposals late in 1936. The United Mine Workers served notice that they would seek a 30-hour week with the same wages, while the negotiating committee for the Appalachian operators, on Dec. 15, suggested a new two-year contract based on a 40-hour work week with the same earnings per day.

Fig. 6—Small stoker sales gain on oil-burner shipments. The figure below shows how sales of domestic and small commercial stokers compare with shipments of oil burners of all types, including industrial.



ANTHRACITE INDUSTRY

+ Presses Drive on Costs and Product

IN THE anthracite region, mechanical loading continues to progress, reductions in tonnage being borne mostly by hand-loading operations. Preparation has advanced mainly in the field of fine-coal betterment and recovery, though some entirely new breakers have been, and are being, constructed in which all sizes are treated. Shallow and small strippings still furnish means of getting coal without heavy machinery, but inevitably with time these will be exhausted and larger units, with ability to handle deeper cover, will displace equipment restricted as to capacity and range of operation.

Though scraper loading had its birth in the anthracite region, and conveyors received early exemplication, progress was for the most part slow and halting, but in recent years the advance in mechanical loading has been rapid.

Thick flat coal readily can be traversed by cars, but gradients are often not steep enough for chutes and yet too steep for car transportation, hence some form of mechanical transport is necessary; conveyors and scrapers have met the need. Between 1927 and 1935, the quantity of coal mined by hand methods decreased 52 per cent. In 1936, doubtless, it decreased still more, though figures are not available.

Had mechanical loading not arrived, a multitude of small dilly roads would have been inevitable, with all the difficulties and dangers they entail. In 1927, 2,223,000 net tons was loaded mechanically underground; in 1935, the figure had increased to 9,279,000 tons—an increase of 317.4 per cent—though in 1935 there was an insignificant decline from that in 1934, yet the decline in hand loading still continued. In 1935, tonnage of scrapers and mobile loaders declined 11.8 per cent from that of 1934; pit-car loaders declined also 4.9 per cent, but hand-loaded face conveyors forged ahead 5.7 per cent, and these account in 1935 for 70.6 per cent of the mechanically loaded tonnage.

In the past year at least 109 new conveyor drives were installed in the anthracite region. New types of drives, however, have not been many. Twenty installations were made of a new electric drive with a connecting frame which allows the unit to be installed at any point along the trough without raising the latter at that or any point more than 12 in. above the mine floor. The roof jacks of these units hold down not the drive but the connecting frame, so that the drive is relieved of the weight and can be made self-aligning. It is said to move material over sections inclined up to 6 deg., whether rock or coal, wet or dry, and to discharge coal into cars up a 9- or 10-deg. inclination, thus dispensing with a pit-car or other belt-conveyor loader. The unit is made by Eickhoff Bros., as is also a 3-hp. loader which has been designed for face and crosscut work, equally low and similarly fitted for operating on gradients up to 6 deg. This has neither puller rods nor guide frames. Eight of these units are in operation.

Auger Cuts Kerf in Coal

Tests are being made at the East Bear Ridge mine of an auger coal cutter that drills a continuous series of holes at a given level in the coal face, simulating thereby a kerf. After the first one is completed, another is made a few inches above it. Into this the machine inserts wedges which force down the coal so that it falls into the kerf below. This being cleaned away, another kerf is made above, and wedges are inserted which bring down another "layer" of coal. The process is continued until the entire seam is brought down.

At the mines of the Kingston Coal Co., since May, 1936, 28 shaker-chute units and six chain conveyors have been put in operation, all of which work in beds over 6 ft. thick and are located where chambers have been rock-packed or flushed and where pillars await extraction.

At the Diamond colliery, Scranton, a property leased from the Glen Alden Coal Co. by the Monarch Anthracite Mining Co., Inc., 83 electric shaker-chute units and 37 chain conveyors now are in use. This property had been idle for four years. Seventeen miles of gangway had to be reopened and reconditioned. As the beds are thin, only by shaking chutes and conveyors could operation be made possible. Wood cars have been replaced by all-steel American Car & Foundry equipment.

Of recent years the larger anthracite companies have not borrowed trouble by extracting pillars where buildings are located over the coal measures, even though the right to remove all the coal is granted to the owner of the deposit. Most of these companies have ample virgin seams into which they can drive rooms, leaving the pillars for future operation, but the smaller companies are often not thus circumstanced. In fact, many of them may soon undertake backfilling, and a few have already done so. Thus the Kingston Coal Co., which has rock-packed or flushed its chambers, is reflushing the voids left by the abstraction of pillars.

So much have such operations impressed the public mind that a grandiose plan to expend $50,000,000 in a broad mine-flushing program has been launched by the public to be conducted, with Works Progress Administration assistance, as a means primarily of finding work for many miners now idle and incidentally to preserve the buildings over areas excavated and to extend the life of the coal field. This, of course, is mostly in the Northern anthracite field.

However, all companies which are fortunate enough to have pillars which are not below urban areas are now recovering all the pillars they can and devising means of doing so with maximum completeness and efficiency. Some in the past year tried to recover them by drilling them by a long hole from end to end, charging and shooting these holes in sections, allowing the coal to flow down chutes to a battery in the gangway.

Because of the high cost incident to the driving of rock gangways and tunnels and rockholes, the Lehigh Navigation Coal Co. purposes to try out the use of Muspratt concrete timber, made of concrete shaken down during pouring and reinforced with steel, such as has been used in flat workings around Wilkes-Barre, Pa. If it will hold thick coal in place in heavily pitching beds it will save many thousands of yards of expensive rock-tunnel and rock-chute work, but the outcome, which is in doubt, remains to be determined.

Drive Much Tunnel Work

Extensions of rock tunnels have been many, especially at the mines of the Lehigh Navigation Coal Co. and the Philadelphia & Reading Coal & Iron Co., and the advance of these tunnels has been speeded by the use of many new devices and methods. At the Newcastle colliery of the Repplier Coal Co. a 1,500-ft. rock tunnel was driven from the North dip of the Mammoth bed in the Mammoth basin, cutting the Mammoth Jugular, Skidmore, Skidmore Leader, Buck Mountain and Scotty Steel beds, all of which are workable. Nine hundred feet of rock gangway was driven east along the south dip of the Jugular bed, with rockholes driven north to extract the Mammoth Jugular bed.

Buck Run colliery, Buck Run Coal Co., drove a 385-ft. slope on a 27-deg. pitch from the surface down the 7-ft. bed and a 290-ft. rock slope to the north on a 25-deg. pitch to cut the Buck Mountain bed on the south dip where a 12-car turnout is being provided.

At East Bear Ridge, the colliery company of that name has put its new and unusual shaft into operation and finds it works satisfactorily. A new inside rock slope has been sunk to another level which is not yet in process of development. The extension of this shaft, which is contemplated, will be accomplished not by sinking the shaft but by raising it from this lower level, thus permitting the uninterrupted operation of the part of the shaft already constructed. The construction of the shaft, which was also upraised, and the hoist which is installed underground were described in *Coal Age* last year (Vol. 41, pp. 182-185; 223-226). Upraising of shafts is rare in the anthracite region, but one at least was so extended—that of the Alden Coal Co. in 1909 (*Coal Age*, Sept. 21, 1912, pp. 391-392).

In 1935 the Glen Alden Coal Co. completed what probably is the deepest shaft in the anthracite region—2,050 ft. deep. It goes to the bottom of the Red Ash basin near its deepest point. This Askam shaft, which is 20 ft. in diameter, is located near Nanticoke, Pa., and is subsidiary to the Truesdale colliery. Though the hoisting equipment is at the surface, the coal will not be brought through the Askam shaft to that level but will be raised part of the way and diverted to other workings, through which it will be hauled to the breaker. Excavation for the hoists was proceeding at the close of 1936, and operation should commence about the middle of the present year.

Large quantities of treated gangway timber are being used by the Lehigh Navigation Coal Co., which is now introducing timber treated by a new method which simulates nature by passing the impregnating material through the timber along the same channels by which sap originally passed into the tree instead of by cross channels, which are less easily penetrable. The impregnating material thus drives the natural sap before it.

Stemming Substitutes

The same company has been making tests of devices for sealing blast holes. These have proved economical in the use of powder and have increased the speed of driving rock work. It has also made tests of the effect of various kinds of powder in shooting coal of equal hardness and, as far as possible, in the same coal bed. Roughly speaking, tests on very hard Mammoth-bed coal showed that the quantity of anthrafine and barley produced directly by the explosion was about 500 times as much as the permissible powder used in the tests.

At the Drifton breaker, of Coxe Bros. & Co., a new bathhouse is to be constructed, and consideration is being given to the heating of water electrically in summer with off-peak current, making attendance unnecessary in the hot weather. Such use of electricity might save also the carriage of coal to bathhouses which are not situated near the breaker.

In many mines, efforts are being made to maintain production when the seven-hour day comes into operation. Motors are being changed to speed up hoists and some preparation units are being added where the present units are being worked to capacity.

Problems of water handling are assuming greater importance with depth, but in 1936 a flood of the Lackawanna and Susquehanna valleys added greatly to these troubles. A severe flood in the former valley on March 20 of last year caused water to create breaches or enter those already formed in the outcrop workings of the old Hallstead colliery, flooding Seneca, William A and No. 9 (Pittston) collieries. As the companies could not recover these properties profitably and many men were laid idle, the State of Pennsylvania undertook to provide pumps and power for the unwatering (*Coal Age*, Vol. 41, p. 355).

Pittston Mine Still Flooded

This work permitted the recovery of Seneca and William A collieries, but No. 9 colliery is still idle and toward the end of the year pumping ceased. To pump out the water, eighteen centrifugal 4,000-volt a.c. motored pumps were specially designed by Barrett, Haentjens & Co., each delivering 4,000 g.p.m. up a 350-ft. lift. These pumps can be used either on a heavy slope or in a shaft. Plans are being made to prevent recurrence of such floods, which so far have not proved disastrous to life but have laid men idle and done immense damage. Some favor diking, which, however, would silt up the rivers and raise the height of the floods by narrowing the width of the stream during flood periods. Others would rely on reservoirs to hold back excess run-off.

Because many of the streams in the anthracite region are silted full of breaker waste, and coal has been mined under the area thus silted, much water enters the mines, to be pumped out, reentering the stream a little further down its channel. In consequence, the bed of Mahanoy Creek is being cleaned from Mahanoy City to Gilberton, though the work has been somewhat spasmodic. The main excavation is being done by the Rhoads Contracting Co. and financed by the Borough of Mt. Carmel and the Works Progress Administration. Completion of the project will deepen and straighten about six miles of creek channel. The maximum cut has been about 21 and the minimum about 9 ft.

Average floor width is about 8 ft., and the material to be excavated aggregates 600,000 cu.yd. Bottom and sides are being riprapped. By the end of January of this year the Borough of Mt. Carmel, the CWA and the PWA will have spent about $900,000. An additional appropriation of $260,000 is requested for the following six months and an additional $300,000 unquestionably will be required to complete the project. Much other drainage work has been done by J. Robert Bazley, Inc., using ⅝-cu.yd. Bucyrus-Erie shovels, which company also has erected an earth retaining wall around the slush dam of the Buck Run colliery of the Buck Run Coal Co., that provision being recommended by the Schuylkill River Survey Project.

In August, 1935, the Buck Run Coal Co. leased the Glen Dower colliery from the Philadelphia & Reading Coal & Iron Co. and to transport coal from that colliery built three miles of 36-in. track, one double-track steel bridge, 150 ft. long, providing the road with a Goyne automatic dump and pusher. In the Glen Dower water-level drift, No. 109 tunnel was extended 520 ft. north to cut the Top Split beds on the north and south dip. Gangways are being driven east and west in order to shorten the haulage.

Preparation in 1936

A substantial upsurge in installation of equipment and revision of methods marked anthracite preparation development in 1936. As in other late years, steam sizes received a large share of attention, and most of the additions to existing equipment were made with the idea of bettering these sizes, with a lesser number of additions devoted to prepared coal. With one or two exceptions, large-scale reconstruction of preparation plants or the building of new breakers, of course, took in both classes of coal. Most of the large-scale work, incidentally, was concentrated in the Northern field, with one new breaker in the Western Middle field, while most of the additions, usually for cleaning one or two sizes, were concentrated largely in the Middle and Southern fields. Construction in 1936 is summarized in Table I.

Six companies in the Middle and Southern fields, including four dredgers, installed Deister-Overstrom "Diagonal-Deck" coal-washing tables for cleaning sizes from No. 1 down to and including No. 4 buckwheat. Wilmot - Menzies hydroseparators were selected by four companies, mainly for steam sizes, while five companies purchased Wilmot-Hydrotator coal-washing equipment with dewatering or dewatering-and-sizing screens, for sizes from rice (No. 2 buckwheat) down to No. 5 buckwheat. The unit for cleaning No. 5 buckwheat went into the Tamaqua colliery of the Lehigh Navigation Coal Co., while the Philadelphia & Reading Coal & Iron Co. replaced an old-type Hydrotator unit in its St. Nicholas central breaker with an improved 9-ft. unit for buckwheat No. 4 with an automatic float control and a capacity of 100 tons per hour.

Wilmot-Simplex jig equipment was selected by five companies, mainly for cleaning prepared sizes. As an example, James H. Pierce & Co., which took over management of the properties of Coxe Bros. & Co., Inc., on May 1, installed three such jigs on broken, egg and stove, in addition to three concentrating tables for buckwheat, rice and barley. Savage water treatment was provided, and an 85-ft.-diameter Dorr thickener was installed, not to save water because of scarcity but because cleaning it and using it again made it possible to eliminate pumping the supply from a much lower source.

In the Northern field, the Pearl Coal Co. replaced equipment already in use with an 8-ft. Menzies cone separator for cleaning prepared sizes, while the Pittston Co. equipped its Underwood breaker with two 12-ft. separators for stove, nut and pea and also installed lime treatment at the same plant with good results. The Susquehanna Collieries Co. rebuilt its No. 6 breaker, Glen Lyon, installing, in addition to screens and other auxiliaries, three 12-ft. Menzies cone separators. Mine-run is crushed to stove and smaller, with two cones for cleaning stove, nut and pea and a third for buckwheat, rice and barley. Feed capacity of the reconstructed plant is 450 tons per hour.

The Glen Alden Coal Co., another Northern-field producer, had installed at the end of the year eight 8-ft. Menzies cone separators for all sizes from stove to barley, inclusive, with a total capacity of 400 tons per hour. In addition, the company is now installing twelve more 10-ft. cones with an aggregate capacity of 960 tons per hour for cleaning the same range of sizes.

The Heidelberg Sales Co. equipped its No. 1 colliery in 1936 with one 8-ft. Chance cone, egg to pea, and one 7-ft. square-topped Chance cone for No. 1 to No. 4 buckwheat, in addition to shaker screens, rolls and other equipment. In the Western Middle field, the Stevens Coal Co. contracted for a new breaker with a capacity of 450 tons per hour. This plant, being erected next to the old Cameron breaker at Shamokin, which is being kept in operation during construction, will have three intake conveyor lines to serve, respectively, a slope to the east, a drift to the west and a dumping station for railroad cars and trucks at ground level beneath the breaker. Equipment includes three sets of crushing rolls, shaker screens, one 15-ft.

Table I—New Anthracite Preparation Facilities in 1936 *

Coal Company	Plant Location	Capacity Net Tons of Feed, Per Hour	Preparation Equipment
Alden Coal Co.	Alden Station, Pa.	20	Wilmot[1]
B. & L. Coal Co.	Peckville, Pa.	25	Wilmot[1]
Black Heath Coal Co.	Minersville, Pa.	15	Wilmot[2]
Brookside Collieries Co.	Pond Creek, Pa.	30	Wilmot[2]
Channel Coal Co.	Auburn, Pa.	8	Deister Concentrator[3]
Coxe Bros. & Co., Inc.	Drifton, Pa. (3)	70	Wilmot[2]
	Drifton, Pa.	15	Deister Concentrator[3]
Dial Rock Coal Co.	Exeter, Pa.	40	Wilmot[4]
Drifted Anthracite Coal Co.	Bowmanstown, Pa.	12	Deister Concentrator[3]
East Bear Ridge Colliery Co	Mahanoy Plane, Pa. (2)	80	Wilmot[4]
Fidelity Fuel Co.	Shaft, Pa.	60	Wilmot[4]
Gap Coal Co.	Bowmanstown, Pa.	12	Deister Concentrator[3]
Glen Alden Coal Co.	Wilkes-Barre, Pa. (20)	1,360	Koppers-Rheolaveur[6]
Harleigh-Brookwood Coal Co	Mahanoy Plane, Pa.	35	Wilmot[4]
Heidelberg Sales Co.	Avoca, Pa. (2)	125	Chance[5]
Landingville Coal Co.	Landingville, Pa. (2)	22	Deister Concentrator[3]
Lehigh Navigation Coal Co.	Lansford, Pa. (3)	26	Deister Concentrator[3]
	Tamaqua, Pa.	25	Wilmot[4]
Lehigh Valley Coal Co.	Wilkes-Barre, Pa. (4)	50	Wilmot[1]
Old Boston Coal Co.	Avoca, Pa.	25	Wilmot[2]
Pearl Coal Co.	Richmondale, Pa.	70	Koppers-Rheolaveur[6]
Phila. & Reading C. & I. Co.	St. Nicholas, Pa.	100	Wilmot[4]
Pittston Co.	Throop, Pa. (2)	300	Koppers-Rheolaveur[6]
Stevens Coal Co.	Shamokin, Pa. (3)	450	Chance[5]
Susquehanna Collieries Co.	Glen Lyon, Pa. (3)	450	Koppers-Rheolaveur[6]
Weston Coal Co.	Shenandoah, Pa.	12	Deister Concentrator[3]

* Also includes rebuilt plants and major installations of preparation equipment in existing structures. Where more than one unit of equipment is installed, the number appears in parentheses after the plant address.

[1]Wilmot-Menzies hydroseparator coal-washing equipment. [2]Wilmot-Simplex jig equipment. [3]Deister-Overstrom "Diagonal-Deck" coal-washing tables. [4]Wilmot-Hydrotator coal-washing equipment and dewatering or dewatering-and-sizing screens. [5]Including Chance sand-flotation equipment. [6]Including Menzies cone-separator washing equipment.

Chance cone for broken to pea and two 10x10-ft. cones for buckwheat to No. 4. Nine 80-ton overhead storage pockets are provided and broken to pea will be loaded over a belt conveyor and boom. Provision also is made for loading trucks beneath the breaker, and conveyors will carry retail coal to existing pockets along the highway.

In contradistinction to the usual practice in the Middle and Southern fields, where the output of hard rock is large and consequently lump, steamboat and broken sizes are picked or, in some cases, run through roughing jigs to remove the rock before crushing, mine-run at the new Stevens breaker will be delivered to a platform shaker, where lump and steamboat will be separated out and sent to a shaking picking table before passing to the main crushing rolls. Broken-and-egg coal, on the other hand, will be sent to the 15-ft. cone for cleaning before crushing, thus eliminating special provisions for removing rock from these sizes before crushing. All sizes from broken to pea will thus be cleaned in the 15-ft. cone and only material passing over a 5½-in. round-hole screen will be hand-picked, thus making it possible to operate the breaker with only eleven men, only four of whom will be employed in picking out rock.

Chance equipment installed in the Stevens breaker also will operate on the cascade system, whereby sand and water pumped up to the 15-ft. cone will run by gravity to the fine-coal cones for reuse before returning to the sump for recirculation. Thus, it is possible to make one sand sump and sand pump serve the entire plant. In the Heidelberg installation, one sump and pump also serve two separate cones, but in this case the stream returned by the pump is divided in proportion to the needs of the two units.

Briquetting Anthracite Fines

Briquetting of anthracite was the objective of experimental work by the Anthracite Research Laboratories, Inc., an affiliate of the Pompey Coal Co., which installed a pilot plant at Jessup, Pa., last year. This plant makes a small anthracite cushion and cylinders about 1⅛ in. long and 1⅛ in. in diameter. If tests prove the feasibility of the product, it is planned to establish a larger plant at Scranton. The briquets are smokeless. Another experimental project in 1936 was the use of a high-gravity liquid in separating impurities from coal.

Tests have been made with Hardinge classifiers by the Lehigh Navigation Coal Co. in the cleaning of anthrafines. These tests are to be continued.

Four 615-hp. Babcock & Wilcox boilers are being installed by Glen Alden Coal Co. at Maxwell colliery to burn buckwheat No. 4 and silt and to generate steam at 600-lb. pressure per square inch. For the present, this steam will be passed to the colliery for general purposes, but later it is purposed to use it for operating a turbine, bleeding off the steam for the colliery at 150 lb. per square inch. Diesel additions in 1936 have been made by another company to a diesel-engine mine-power station operating in the Northern field, near Carbondale, Pa.

Stripping Still Active

For lack of underground development all the anthracite companies in the last few years have had to depend on strippings for coal. The number of small strippings and, therefore, the number of small stripping units has increased considerably, but in the next few years these smaller jobs will exhaust the territory which they serve. The number of these strippings and the number of small contractors has increased, due in part to the leasing of such areas to individual operators, who in turn have done everything they could to get inexpensive strip-pit coal.

The many dirt roads that have had to be constructed by the contractors have made the building and maintenance of such roads a matter of careful thought. Bucyrus-Erie has brought out a machine for road making and improvement with a blade that has a wide range of maneuverability. It can be moved up or down rapidly and forward or backward about a common point in the center of the blade, thus permitting faster and more efficient grading. Roads are being kept in condition by the Bazley company with Allis-Chalmers bulldozers for roughing and road patrols of the same company for the finished job. Heavy trucks are mostly of steel.

A large stripping has been started near No. 4 shaft of the Baltimore colliery of the Hudson Coal Co. near Scranton to dig out a fire area which has been burning for many years. It is calculated that the coal recovered will bear the expense. A Bucyrus-Monighan walking dragline is in operation with a boom longer than any at present in use in the anthracite region—about 200 ft. However, as the boom starts nearer the ground than with other shovels, its reach in piling spoil is thereby limited.

At Locust Gap a large stripping has been started by the A. E. Dick Construction Co. for the Philadelphia & Reading Coal & Iron Co., where it will employ the largest heavy-duty trucks in the anthracite regions under the most trying conditions. Much of the excavation will be in hard rock. The Rhoads Contracting Co. is using an air-speed spudder for drilling. It consists of an air cylinder for lifting the tools and to act as a shock absorber to prevent the shock of the falling tools from being communicated to the drill frame and mechanism. With this equipment, steel rope can be used satisfactorily instead of manila cable.

Diesel equipment has made considerable progress in stripping work, some trucks, caterpillars, tractors and shovels using it as motive power; at the same time the percentage of electrical equipment for the operation of shovels and draglines has increased considerably. A number of aluminum and alloy booms have been introduced in the field, with the result that bucket sizes have been used that would have been unsafe with heavier or weaker steel booms. Counterweighted booms perhaps have never been used, though in the bituminous regions these are becoming universal.

Coal for Stabilized Roads

A type of road known as a "stabilized road" made of granular material, a colloid such as clay and some form of salt—either common salt or calcium chloride—having had extensive demonstration in the United States and Canada is being promoted by the Federal Bureau of Roads and the various State departments of highways. Tests are being made using anthracite slush as the granular material for such roads. A section of such road was constructed by the State Department of Highways during the summer of last year. How successful it will be will take some months to determine.

Because of the lull in construction, the Lehigh Navigation Coal Co. has done no new work on the use of anthracite breaker waste as a lightweight aggregate for concrete. However, though actual marketing is delayed, the production problems are regarded as solved. The use of detached rubber mine-car bottoms, which drop and thus discharge the fine coal in the bottom of the car on dumping, has been under continued test and has met with a degree of success.

ANTHRACITE

+ Takes Sales Story to Consumers

INAUGURATION of a cooperative advertising campaign to capitalize on the advantages of anthracite as a domestic fuel, the work done in recent years to improve the product and the equipment now available for modern heating was the outstanding development in the hard-coal merchandising front in 1936. In order to carry out this program of mass consumer appeal effectively a new organization—Anthracite Industries, Inc.—was launched last June. Membership in this venture represents 85 per cent of the anthracite output and its promotional work is financed by an assessment on tonnage. A three-year program has been planned (*Coal Age,* Vol. 41, p. 345).

Actual publication of copy began in November. During the last two months of the year six advertisements appeared in 91 newspapers in 59 cities. The space used approximated 550,000 lines. At the outset, not only the retail coal merchants but equipment manufacturers and distributors were invited to take advantage of this opportunity and to tie in to the campaign. The results were gratifying in that 2,495 retailers using 167,808 lines joined in the campaign, while 640 equipment manufacturers and dealers (although for many of them it was the "off season" and their advertising budgets were made up during the forepart of 1936) used 71,395 lines in conjunction with the Anthracite Industries, Inc., campaign.

An opening gun in the publicity campaign (Original, 10¾x14½ in.)

There's NEWS in modern ANTHRACITE
New Equipment helps pay for AUTOMATIC ANTHRACITE HEAT
THERE IS NEWS—news worth knowing—in the anthracite and anthracite heating of today. Remarkable progress has been made in anthracite equipment. You can now add, unit by unit, controls and accessories to your present heater and build towards completely automatic anthracite heat with or without air conditioning. As you build, you save enough with this low cost fuel to help pay for new equipment as you add it.
If you have not recently compared developments in heating equipment, modern anthracite developments will amaze you. Learn the facts, vital to your heating satisfaction, about the anthracite of today—a washed, screened and processed fuel full of concentrated heat. All of its clean and safe comfort, healthful, even heat is yours with any degree of convenience you like. For full information, ask your dealer or write to Anthracite Industries, Inc., Chrysler Building, New York, N. Y.
ANY DEGREE OF CONVENIENCE YOU WANT IN MODERN ANTHRACITE EQUIPMENT
From fireplace to complete automatic anthracite heating or air conditioning, anthracite equipment of today is smart in style, amazingly efficient, convenient, and easy to buy on the monthly payment plan.
YOUR LOCAL DEALER SELLS
Pennsylvania ANTHRACITE COAL
THE SOLID FUEL FOR SOLID COMFORT

Reach Over Six Million

This makes a total of 239,203 lines of supplementary advertising all toward the end of acquainting the public with the availability of anthracite to do a modern heating job in modern heating equipment. Thus more than 750,000 lines in all was used in the six insertions, reaching more than 6,000,000 readers. The entire lineage was used in the eastern Atlantic seaboard section of the United States. This being the primary market for anthracite, it was selected as the test campaign, and the results justified the decision.

The motif of the entire campaign is that "There is news in modern anthracite". Each advertisement stressed the availability of anthracite to provide any degree of convenience in heating desired by the consumer

from the steady heat of a flat-grate boiler to complete air-conditioning with automatic anthracite thermostatically controlled. Boxes in each advertisement pointed out the variety of equipment which can be used to burn anthracite—the anthracite room heater, anthracite water heaters, boilers for steam vapor or hot water, magazine feed heaters, automatic anthracite burners, cook stoves for home, club or restaurant; warm-air furnaces, as well as complete automatic heat and air-conditioning equipment.

A primary slogan — viz., *"The* Solid Fuel for Solid Comfort"— which was adopted as characterizing anthracite was carried in every advertisement, as well as a secondary slogan, viz.:

Pennsylvania
ANTHRACITE
Coal

which latter phrase was not only stressed in order to differentiate the product from foreign anthracites but also to educate the public to the knowledge that anthracite is a distinctive coal. It is encouraging to note that coal merchants in their tie-in advertisements availed themselves of these slogans and that producing companies in their own advertising are doing the same thing.

As part of the campaign also a mat service was offered to the retail trade as an assist in tie-in advertisements. Many of these mats were used, while numerous other retailers ran their own copy or that offered by the anthracite producer from whom they buy. Shortly after the advertising campaign started, interest in it was evidenced in communities in which it was not being run. Retailers in these communities wanted to take advantage of the campaign and Anthracite Industries, Inc., therefore offered to supply any newspaper in the Eastern section of the country with the advertisements of the main campaign as well as the tie-in mats where the dealer showed an interest. In numerous cities, as a result, portions of the campaign were run, supported entirely at the hands of the retail trade. On this part of the campaign no lineage figures are available.

One of the many pieces of copy available to retailers who want to tie in with the general campaign. Retailers have their choice of one-, two- and three-column advertisements.

The health, comfort and safety of your family...depend a lot upon the fuel you use. For steady heat to give healthful, even temperature, there's nothing like the warm and friendly glow of anthracite. For safety there's nothing like a solid fuel, and Pennsylvania Anthracite Coal is *the* solid fuel for solid comfort. It can give you any degree of convenience you want, in the smart and modern anthracite equipment of today. For service to match the quality and economy of the anthracite you use, place your orders with

INSERT
TRADE MARK
HERE

(DEALER'S NAME AND ADDRESS)

***THE* SOLID FUEL FOR SOLID COMFORT**

Coordination Major Objective

From the outset of Anthracite Industries, Inc., its purpose was conceived to be that of coordinating the various branches of the industry into a unit that might function more effectively for the good of all than when the different branches operate independently. Toward this end a field force of eighteen representatives was created to function in a liaison capacity among anthracite producers, anthracite retailers, equipment manufacturers, equipment distributors and consumers. Eighteen territories were set up covering the various States in the Eastern seaboard area: two territories for New Jersey, two for Pennsylvania, five for New York, two for the Washington area and two for Massachusetts. The work of the men in these territories includes contacting retailers, equipment manufacturers and, in the case of dissatisfied large users of anthracite, consumers. They have been instrumental to date in holding on

Frank W. Earnest, Jr.
President, Anthracite Industries, Inc.

anthracite numerous institutions and homes that had planned to change to a competitive fuel.

These representatives have already proved their effectiveness in curbing the change from coal to competitive fuels. Particularly has this been true in the case of several large home-building undertakings where it was originally planned to put in competitive equipment and where instead thermostats were installed as the first step toward a modern coal-heating plant. In fact, one of the strongest arguments used both in advertising and in field work, second only to the inherent advantages of anthracite as a domestic fuel, is the ease with which increasing convenience can be added to an anthracite-burning heating plant. The consumer is reminded that, starting with a flat-grate boiler, he can add a thermostat, thus effecting partial automatic heat. Later he can add an automatic coal burner, with bin feeder and ash removal, completely eliminating hand attention.

The second schedule of newspaper advertising, covering 66 cities in the eastern sector of the United States, has just been released, the first insertion to appear Feb. 2. Copy continues to stress the even heat obtainable with anthracite and the convenience its automatic use affords the consumer. As with the earlier schedule, tie-in mats will be offered the retail trade through the newspapers carrying the campaign. All retailers in cities in which the schedule is to be carried have been notified when the insertions will run and have been invited to insert their advertising simultaneously, using the mats offered by Anthracite Industries, Inc., copy supplied from the producer from whom they buy coal, or their own copy.

PROFITABLE TONNAGE

+ Major 1937 Problem, Say Executives

COAL, which caught few drops from the golden stream of the Coolidge boom and has shared relatively little in the financial recovery of the past two years, is distinctly profit-minded as it faces 1937. To many bituminous executives who look back to the more prosperous NRA days, profitable production seems possible only if Uncle Sam again steps in as umpire and ultimate dictator of prices. But such intereference, in the opinion of other operators, would only delay the day of sound stabilization or mean curbs which would prove more costly in the future than any immediate gains.

Anthracite producers also are preoccupied with the problem of widening the margin between outgo and income. Labor and labor policies bulk larger in anthracite executive thinking than in the bituminous fields, although there, too, there is growing concern lest labor push its present advantage too far and wreck the prospects of both employers and employees. Both anthracite and bituminous operators see excessive transportation charges as a handicap to recovery. Higher wage costs per ton make the anthracite industry more fearful of the effect of the addition of the costs of social security insurance on the free movement of hard coal.

Profit Real Job

"The biggest problem confronting the industry in 1937," states J. D. A. Morrow, president, Pittsburgh Coal Co., "is the job of getting a better price for coal so that we have an industry as industry ought to be, viz.: with the definite purpose of making a profit instead of mining out past investments in our properties." To Arthur B. Stewart, president, Davis Coal & Coke Co., the question is one of securing a delivered cost which will both maintain and increase the demand for coal. Unfortunately, "there seems no doubt that Congress and legislatures of various States where coal is produced will materially add to the cost burden of coal production."

Business recovery this year, as James D. Francis, president, Island Creek Coal Co., sees it, will absorb practically all the industrial coal produced. The biggest problem facing the industry, therefore, is that of securing a fair price for this tonnage to meet increased costs of supplies, taxation "and the intangible increase in labor costs due to lack of efficiency during periods of industrial expansion such as I expect in 1937—and, in addition, get enough money to return to the industry a reasonable profit to allow the properties to be kept in shape and return an income to the owners.

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Question and Answer

"WHAT is the biggest problem confronting the coal industry in 1937 and what should be done about it?" Last month *Coal Age* addressed this question to a group of coal-company executives in various parts of the country. The responses—coming from the presidents of operating organizations in Alabama, Arkansas, Colorado, Illinois, Indiana, Kansas, Kentucky, Maryland, Ohio, Oklahoma, Pennsylvania, Utah, Virginia, Washington, West Virginia and Wyoming—are summarized in the symposium which starts on this page.

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"Cooperative sales agencies like Appalachian Coals, better merchandising by independent producers and less attention to misrepresentations by purchasing agents as to what your competitor is doing will bring about this increase in price. This increase should be at least 35c., and probably 50c., over the price for which industrial coal sold in 1936." If the producers wait for legislation and prices fixed under such legislation, Mr. Francis concludes, "1937 will be a year without any substantial profit—in a period of general business prosperity."

Labor demands involving higher costs are emphasized by Moroni Heiner, president, Utah Fuel Co., who believes that the industry "should be given more latitude to settle its own problems and compete with other fuels. This will mean further mechanization and better preparation, particularly of the smaller sizes. Satisfaction with coal is a prerequisite to increased demand and better realization." Mining is so inextricably bound up with general prosperity, Carson W. Smith, president, Consolidated Coal & Coke Co., points out, that "it is hopeless to expect a solution of our difficulties without first improving conditions generally." Mine management must produce more coal at lower cost, with less waste and with fairness to itself and its employees.

Federal Aid Needed

Achievement of profitable operation, asserts J. Hale Steinman, president, Steinman Coal Corporation, demands the adoption of "NRA methods for the entire industry." Production control or price fixing by legislation "is imperative to preserve the industry," declares Andrew B. Crichton, president, Johnstown Coal & Coke Co. But "all those advocating government control by the Guffey bill," he warns, "should understand that it means the end of private control." Nevertheless, in the opinion of C. E. Bockus, president, Clinchfield Coal Corporation, "passage of the Guffey bill is the first thing that should be done" if the industry is to remain solvent.

Some bituminous producers stout-

ly opposed to government control accept its imposition as inevitable and join with groups more favorably disposed to the idea in stressing the importance of the terms of the proposed legislation. R. C. Hill, president, Consolidation Coal Co., and Douglas Gorman, president, Cumberland Coal Co., for example, rank the type of legislation adopted at the top of the list of major problems. Enactment of the new Guffey bill in its original form, remarks C F. Richardson, president, West Kentucky Coal Co., "will be very detrimental to the industry because it will increase the cost to the consumer, so that a very large tonnage will be lost to other forms of energy."

Why Single Out Coal?

This danger also impresses several other commentators. "If coal is to be regulated," says E. R. Keller, president, Franklin County Coal Corporation, "the entire fuel industry also should be regulated, so that we do not find ourselves in the same position that operators under the Jacksonville agreement found themselves a decade ago." Reaction upon price relationships cannot be ignored, asserts E. M. Cortright, president, Hastings Fuel Co., and regulation should embrace protection as well as control. The major problem in the Southern field, according to R. T. Daniel, president, National Coal & Coke Co., "is the control and taxing—on a relative basis—of competitive fuels and power."

Organized labor is criticized by more than one executive for its apparent indifference to the effect of rising costs on the volume of sales. Higher costs, as J. E. Butler, general manager, Stearns Coal & Lumber Co., sees the situation, mean higher prices "if we stay in the business. Each time the price is advanced certain markets are lost." Further increases in costs, agrees Joseph Pursglove, president, Pursglove Coal Mining Co., will drive more consumers to substitute fuels. Legislation, however, is necessary, Mr. Pursglove insists, to stabilize the industry and put a stop to profitless production.

Since legislation seems certain, the coal operators, states John C. Cosgrove, president, West Virginia Coal & Coke Corporation, should try to direct it into sound channels "so that we get a bill which is fair and equitable to all parties and does not inflict any more of the objectionable features of government control than is necessary. The second biggest problem is research, and what to do about that is much greater financial support for Bituminous Coal Research, Inc." Effective legislation, concedes N. D. Moore, president, Pacific Coast Coal Co., "probably is the only answer" to the problem of stabilizing prices to meet mounting costs of labor, supplies and taxation.

Coal may well take a leaf from the experience of the oil industry, which found it could not rely upon voluntary regulation and self-control, suggests Earl Cobb, president, San Bois Coal Mining Co. "While we dislike to see government in business," says T. J. O'Brien, president, Kemmerer Coal Co., "I seriously doubt that the industry as a whole will secure the cost of production from its coal without some regulatory law." Whether regulation can be made workable and can "pass the scrutiny of the Supreme Court remains to be seen." Price stabilization, in the opinion of Ellis Taylor, sales manager, Ben Hur Coal Co., "holds the key to most of the problems of the industry" and legislation is needed to make such stabilization effective.

Faces Triple Menace

As the industry enters the new year, it is confronted with three major problems, declares O. L. Alexander, president, Pocahontas Fuel Co. These are: (1) The labor program, (2) "the attempt to pass special legislation to control the coal industry," and (3) excessive rail freight rates. Transportation charges also are the target of J. J. Atwater, president, American Coal Co. of Allegany County, who believes present rates are driving business to other forms of energy, and urges reductions. Competitive relationships are assailed by W. J. Faux, president, Logan Coal Co., who asserts that advantages "which the Southern shippers enjoy in New England and Western markets" are responsible for "the discouraged position of the coal producers of central Pennsylvania."

Freedom of management is the biggest problem facing the industry, according to George W. St. Clair, president, Jewell Ridge Coal Corporation, who fears that nothing can be done about it "until the federal government has satisfied itself that it cannot control and operate the industries of the United States. The matter will just have to run its course." But "it would be helpful if the managing heads of the coal industry could get together on a policy and plan, stick to it and push it." Development of a leader "broad enough to have the confidence of the entire industry" is looked upon by R. D. Patterson, president, Weyanoke Coal & Coke Co., as the first step in solving the many problems which must be met.

With demand improving, "it is nothing short of a crime for politicians in Washington to harass the coal industry continually with their absurd legislation," bitterly comments one large Alabama producer. Reestablishment of NRA control or reenactment of the Guffey bill, he contends, would do great harm. It is only necessary to look at the General Motors strike and the Pacific Coast tie-ups, he adds, to realize the danger of governmental encouragement of unwise labor leadership. To J. W. Carter, president, Carter Coal Co., and J. G. Bradley, president, Elk River Coal & Lumber Co., regulation such as proposed by Senator Guffey would foster monopoly and hamstring the industry.

New Dollars for Old

How to take back a new dollar for an old one is the biggest problem which must be solved, says Walter Robison, president, Youghiogheny & Ohio Coal Co. One school of thought, he observes, holds that salvation lies in federal legislation permitting price fixing; a second group "believes that the industry should and must be progressive and adopt all means available, mechanical or otherwise, to produce a higher grade product than formerly at a lower cost. While I think the first group is pursuing the expedient course and that proper legislation will be very helpful, nevertheless, irrespective of whether legislation is enacted, all wide-awake operators will go forward with the second idea."

Although opposed in theory to too much government control of business, Whitney Warner, president, W. H. Warner & Co., feels that some federal supervision is necessary in coal. His only objection to the Guffey bill is that "to get the average cost of production makes the price of coal too high to compete with gas and oil. If legal, I would prefer a bill that set the price at not to exceed the average cost of those producing 75 per cent of the cheapest coal." Control which would establish minimum floor-level prices based on total cost in various producing districts is the solution offered by one large Illinois operator to the problem of "making sales in volume that will carry a reasonable margin of profit over cost."

Such a cure for profitless production, asserts Howard Showalter, president, Monongahela Rail & River Corporation, cannot be effected without regulation by a federal commission, "which will also have to do with assisting in the finding of new uses and new markets." Price fixing, he adds, should be left in the hands of this commission. If tonnage were allocated, sales put on a basis of quality and classification with a fixed price for each class and there was "some kind of federal control" with enough teeth in it to be effective, says E. C. Minter, president, Minter Fuel Co., "the operator then could make a little money."

Because repeated attempts of the operators to work out a program which could promote orderly marketing and check demoralization in prices have ended in failure, "creation of some form of national legislation and a regulatory body to establish a minimum-price basis" is necessary, declares Frank H. Woods, president, Sahara Coal Co. Working out the details of classification, cost and price determinations and correlations under such legislation, remarks Louis Ware, president, United Electric Coal Cos., "is a job big enough to keep the industry thoroughly occupied for some time. Another important problem is that of correcting the tendency toward a lower average price because of the greater proportionate consumption of fine sizes."

What Type Control?

How the marketing provisions of proposed control legislation should be framed and how the industry will react to and work under such proposals top the problems of the industry in 1937, in the opinion of Hubert F. Howard, president, Binkley Coal Co. Operators' meetings to date, he points out, have developed two schools of thought. One favors the bill as drawn, with compulsory classification, price fixing and correlation by a federal commission. The second school favors "a simple marketing provision based on the statement by Congress that the sale of coal below cost (including administration, selling expense, depreciation and depletion, as well as other costs) is unfair trade and unfair competition, and providing for some form of penalty for violation.

"The latter theory," continues Mr. Howard, "preserves to each operator full control of his business, with the right to fix prices on all different sizes, provided that at the end of the year his mine-run realization is equal to his preceding year's mine-run cost. It is simple and enforceable, and preserves to the operator the greatest autonomy over his business. It preserves to investors any economic advantage that properties now have due to location, freight rate, transportation costs, cost of production due to investment in equipment and machinery, etc., and the benefits of management and sales ability."

That rigid government control is necessary to enable the industry to maintain proper wage standards and working conditions, meet competition and still remain solvent is challenged by W. C. Shank, president, Reliance Coal Corporation. "The high-cost operator," he says, "wants rigid government control with the hope of accomplishing by legislative enactment that which economic competition will not provide. I believe that the government cannot for long legislate profit into an industry having so many limiting factors restraining its accomplishment in spite of monopolistic methods."

Federal Regulation Opposed

As an alternatve, Mr. Shank proposes relaxation of the anti-trust laws to permit agreement on prices and policies "subject to reasonable government supervision. If the genius and ingenuity of those engaged in industry cannot work out its own salvation, I feel confident that the government cannot do it through inexperienced agencies." Political interference with the coal business, says R. H. May, manager of sales, Northern Illinois Coal Corporation, is no more needed or justified than in any other industrial effort. The need for stabilization, remarks W. F. Davis, president, St. Louis & O'Fallon Coal Co., has existed since the second mine was opened; while NRA "did not cure all our ills, it did prove to be pretty good medicine" while it lasted.

Uncertainty is the greatest handicap and problem of 1937, asserts Eugene McAuliffe, president, Union Pacific Coal Co. Strike talk, causing consumers to pile up fuel reserves, makes them feel that "coal has not yet been provided with a certainty of supply such as attaches to natural gas and fuel oil. As long as the industry is threatened with arbitrary legislation, it will not settle either its market or its labor relations. Wage agreemeats should be extended, leaving to the mine workers the right to protest against the certain companies unwilling to pay a living wage—if such now exist. Those who deal fairly with their employees should not be persistently threatened with interference of operation and the work of caring for their patrons."

Rating the labor question at the top of the list, E. J. Rowe, president, Porter Coal Co., urges that both sides approach it in a spirit of calm deliberation to avoid hasty decisions which might have far-reaching repercussions. What can be done to provide for the men forced out of the industry by the closing of hand-loading mines "due to the installation of large loading machines in other mines or the division of work with only a small amount of work for the individual miner" is the aspect of the situation which troubles Glenn A. Shafer, president, Pana Coal Co. Social-security legislation, he contends, puts the mine depending largely on man power at a further disadvantage in competition with the machine-equipped operation.

If the Southwest is to hold its domestic business, says A. F. McElhenie, vice-president, Pittsburg & Midway Coal Mining Co., it must "take an active part in the promotion of domestic stokers and thereby build up the demand for small sizes to a point where the law of supply and demand will provide a price that will enable us to crush the coarse sizes we are now endeavoring to sell for use in domestic equipment." Competition with oil and gas, in the opinion of C. J. Sandoe, vice-president, West Virginia Coal Co. of Missouri, makes it necessary "to assist the densely populated districts in burning coal smokelessly." Turning to the East, Marshall John H. Jones, president, Jones Collieries, Inc., voices the opinion that legislation will stimulate the demand for prepared sizes.

Labor Problem Near Top

Labor and legislation take first place in the industry's problems, according to Heber Denman, president, Paris Purity Coal Co. A new wage contract unduly restricting shift and weekly maximum working periods or pushing wages to unreasonably high levels, he points out, will drive more consumers to substitute fuels. In the Southwest, where competition with oil and gas already is extreme, such a development would be disastrous. Legislation hampering the mining of coal also would be a menace—particularly to the smaller producer.

Substitution of real collective bargaining for "collective domination" is the crying need of the coal industry, declares James H. Pierce, presi-

dent, James H. Pierce & Co. Unlike the automobile industry, where management can build to a price by changes in production methods and shifting of personnel, coal is compelled to start from a cost determined on a national scale. While individual rates may not be excessive, their application is too often surrounded with unwise restrictions which curtail productivity and increase costs. Increasing costs, in turn, act as a brake on sales volume and decreased output then is used as an argument for further boosts in wage rates.

The thing most to be feared, says James Prendergast, president, Susquehanna Collieries Co., is "too high cost of our product. Coal finds more competition in oil and gas in recent years, and the specter of water power hangs over the industry should the price increase to any considerable extent. If labor rates increase to a point where costs react unfavorably on markets, the industry can meet competition only in one way: by mechanization, with the consequent loss to labor of a great many men. On the other hand, if coal cannot meet this competition by mechanization, the inevitable loss of markets will again react unfavorably in loss of work for a great many of our employees."

Anthracite's biggest problem, in the opinion of J. B. Warriner, president, Lehigh Navigation Coal Co., is that of "making ends meet" and this job is being attacked vigorously by the operators. The greatest hope for the future, he thinks, lies in the work of Anthracite Industries, Inc., in developing and promoting the sale of new equipment. "There is now much new and astonishingly efficient equipment on the market and more is being developed, and it is necessary to acquaint the public with these developments." To John C. Haddock, president, Haddock Mining Co., however, the question of what to do about social-security taxes, which eventually will approximate 18c. per ton and which cannot be passed on to the consumer because of competition with other fuels where labor costs are a much smaller percentage of total costs transcends all others.

How to recover lost markets must have first consideration in surveying the anthracite outlook, states Edgar O. Marty, president, Sherman Co. The job is not an easy one and will take considerable time. Much may be expected from the activities of Anthracite Industries, Inc., and the promotion of automatic heating with hard coal. Here the industry can profit by the experience of the oil-burner manufacturers with their emphasis on heating convenience. Recapture of the markets now enjoyed by the bootleggers is another step which must be taken. This will require considerable education to change public opinion and possibly some concessions "all around."

Adoption of the 7-hour-day program in May, it is estimated, will increase anthracite costs 20 to 45c. per ton. "There is no margin between realization and cost in the industry," is the comment of another producer, "that can take up any such swell." Social security and unemployment taxes, he continues, will add another 12c. to present costs and there always is the danger of further burdens when the Legislature is in session. And the bootleg problem still remains.

BITUMINOUS MINES

+ Put New Instrumentalities to Test

RENEWED market activity infused new life into the bituminous coal industry in 1936. Every form of activity showed advances, not alone in new methods but also in the adoption of well-tested and approved practices. Abundant evidence is available that the year 1937 will outstrip even 1936. More cheering than the new items in the calendar of the past year, as recorded in this issue, is the assurance derivable from this record and the prognostications for the coming year that the companies that have been dubious as to the value of the more recent innovations have been convinced at long last that the new methods have proved themselves of value, and must be adopted. The laggards now are preparing with enthusiasm to follow the industry's leaders in all lines of technical advance.

Cutting equipment advanced during the year in four directions, toward: (1) further installation of track-mounted cutters and shearing equipment, often with power-drilling accessories; (2) use of small inexpensive machines to cut face-conveyor places where it is inconvenient to move the machine from one conveyor face to another; (3) higher-capacity equipment for cutting longwall faces; (4) adaptation of machines for shortwall as well as longwall cutting so that the same machine may be used both on a short face like that of a heading or on one of greater length.

Among recent new users of track-mounted equipment, which cuts without the delay incidental to removing the machine from the truck and replacing it, without the delay of bringing it back from a remote corner of the face or the setting of jack posts, etc., is the Pocahontas Fuel Co., which has installed a number of universal coal cutting-machines making horizontal and vertical cuts anywhere in the seam. The Tennessee Coal, Iron & Railroad Co. will soon be operating nine Jeffrey 29U and eight Sullivan 7AU track-mounted cutters. Progress in that direction also has been made by the Utah Fuel Co. and other Utah operators; the equipment used cuts horizontal and vertical kerfs and also drills the coal face. With this equipment the companies expect confidently to increase the length of cut per machine, to reduce powder costs and to produce coal of larger size than heretofore.

Antiquated second-hand machines frequently have been used to cut single places where face and room conveyors interfere with the travel of a machine from face to face and

where places have to be cut repeatedly. During the past year, however, machines designed specifically for this work, such as the Sullivan 5-B "Buddy" coal cutter and the Jeffrey 41A, were placed on the market. Installations of "Buddy" cutters, which are only 16 in. high, 28 in. wide and 36 in. long, exclusive of the bar, cut a 2½-in. kerf to a depth of 5 ft., were reported in some States.

Modern machines have large advantages over old ones: two-drum independent underground drum drives with two speeds for each drum, separate drum-retarding clutches, lever-controlled drum clutches, free-wheeling drums, more direct lead of feed ropes, complete rear-end control, narrow front end, drop-out chain clutches, alloy gears and shafts, ball bearings, splash lubrication, powerful motors, electric control, circuit breakers, higher feed speeds, and cutters that travel either forward or backward across the face. These are designed to make the new machines more effective, safe and adaptable than before. A screw that tilts the entire cutting element so that the cutter bar can be tilted and the kerf made to follow the floor level is a feature in the recently introduced Goodman shortwall cutter No. 412.

Hard Surfacing Makes Gains

Further progress was made in improvements in cutter bits. Among the operations adopting hard surfacing as standard practice were the No. 2 mine of Bell & Zoller Coal & Mining Co. (*Coal Age*, Vol. 41, pp. 366-367), Wheelwright mine of the Inland Steel Co. and the mines of the Wasson Coal Co., of Illinois (*Coal Age*, Vol. 41, pp. 597-598). In the first instance the cost of labor and material for hard surfacing is half as much per ton of coal cut as was the labor for sharpening bits before the treatment was introduced. Cutting speed is increased; cuttings are coarser, making a better product; dust is reduced and the men now spend 25 per cent less time replacing bits, hence more coal is cut per man-day.

The number of companies in Illinois and Indiana using heat-treatment of bits also has greatly increased. In the Rocky Mountain field, Bowdil and Cincinnati double-ended bits were used extensively prior to 1936, and still more companies adopted them last year. One company has been retipping them with hard-surfacing alloys.

The Powhatan Mining Co., Powhatan Point, Ohio; the Summit Coal Co., of Metalton, W. Va., and the Black Eagle Smokeless Coal Co., Inc., Mullens, W. Va., report favorable experience in the use of Voortman concrete safety plugs. The second company found that the slack-and-nut yield over a 1½-in. screen decreased 6 per cent, and that egg and lump sizes increased by the same proportion. With 14-ton production per pillar cut at No. 1 mine the explosive used decreased 10 to 13 per cent, and at No. 2 mine —where 18 tons is brought down per cut—the quantity of explosives used dropped 8 per cent. Safety also was increased, and the coal obtained was less subject to disintegration. The Black Eagle company reports a much better lump coal as a result of the innovation; slack was reduced about 5 per cent. The coal arrived at destination in better condition and is selling at a 10c. premium. The coal, which has an 8-in. bone, also is more easily cleaned because the bone is not shattered.

Cardox has had increased application. During the year, release pressures have been halved, so that they range between 8,000 and 20,000 lb. per square inch. The volume of carbon dioxide in the charge has been about doubled. Carbon dioxide is now obtained by absorption from boiler-flue gases, lime-kiln gases, chemical plants, fermentation vats and carbon-dioxide wells. With the lower-pressure Cardox, the coal is brought down with a still further reduction of shattering action.

Haulage is still quite grievously out of date at many mines. With all the modern adjuncts and improvements too expensive for a small car and less costly per ton transported, the large car becomes an essential, especially since the small car on long trains is more likely to be damaged and give trouble. The loading crews have now been trained; mechanical loading has come to stay; most of its problems are solved; managements now recognize that the time has come to fit the haulage equipment to the needs of the loading units, without which adjustment neither loading nor transportation equipment can do its best work. The coal industry can look, therefore, for ever greater activity in car building.

But between loading improvement and big haulage equipment lies another and preliminary change: heavier tracks with better track accessories. The Pocahontas Fuel Co., Inc., reports considerable improvement in haulage. Ten miles of main trackage has been laid with 85- instead of 60-lb. steel. In some of its mines all room track has been changed from 25- and 30-lb. to 40-lb. steel, and this though the company loaded no coal mechanically in 1936 and does not expect to do so in 1937. However, the coal is in general in a thick seam for which large cars have been installed.

Inverted cross-rails welded to the underside of the two 75-lb. rails of a main-line track, so as to act as a brace holding the two rails to gage, to prevent overturning and in general to stiffen the track, as also to provide cross-bonding, for some years has been progressing at Valley Camp Coal Co.'s Wheeling division mines (*Coal Age*, Vol. 41, p. 173). Several companies, including the Industrial Collieries Corporation, at Barrackville, W. Va., have intro-

duced such track provisions. A short stretch of track for experimental purposes has been provided at the mines of the Buckeye Coal Co., in the expectation that thereby it may be possible to reduce tie size and improve the return-current system of the mine.

As a result of the experience at Willow Grove mine in 1935, Hanna Coal Co. in 1936 used Thermit welds on 5,000 ft. of 60-lb. track in Piney Fork No. 1 mine, thus obtaining a smoother road, less frequency of derailment, reduced coal spillage, reduction in joint maintenance cost and about 20 per cent increase in rail conductivity (*Coal Age*, Vol. 41, p. 137). This track is laid on 4x6-in. treated ties with a steel tie in place of every fourth wood tie and ballasted with 1x2-in. slag.

Heavier Rail for Main Track

At the mines of the Sheridan-Wyoming Coal Co., in northern Wyoming, transportation has been improved by extending the main-line-haulage and secondary-haulage tracks. Much 30-lb. rail has been replaced with steel weighing 65 lb. per yard. Pressure-treated timber with tie plates are used whenever ties on main-haulage track are replaced, and all extensions on such roads are made with heavy steel. Even the extensions of secondary-haulage track in some instances are laid on pressure-treated ties. At its Glen Cambria mine, Brownton, W. Va., Mountain Fuel Co. also reports much track improvement.

The Davis Coal & Coke Co. has replaced several old headframes with new steel structures and electrified several hoists. A 7x10-ft. 6-in. Nordberg cylindro-conical drum hoist of 700-hp. capacity has been installed at the Glen White operations of the Koppers Coal Co., also a 400-hp. Allis-Chalmers slope hoist at the mine formerly operated by the Sonman Shaft Coal Co. at Sonman, Pa., and now operated by the Koppers interests.

Vesta Coal Co., California, Pa., has added 650 four-ton cars, the Koppers Coal Co. 601 cars at its several operations. Other companies reporting car purchases are the Alabama By-Products Corporation and the Dawson Daylight Coal Co. The first company added to its haulage equipment four 23-ton electric locomotives. In the Somerset mine of the Utah Fuel Co. and Calumet No. 2 mine of the Calumet Fuel Co., both located in Colorado, a start has been made in mechanization by the introduction of permissible storage-battery locomotives. Hereafter, all new electrical equipment at the mines of the Utah and Calumet companies, except possibly at Clear Creek, will be of permissible type.

Old Ben Coal Corporation was one of the first to use cast-steel wheels on a large scale in Illinois. Since that time use of steel wheels in that State has been increasing. At the New Monarch and Mt. Olive mines, in Illinois, the Consolidated Coal Co. has thus far put in service 150 Bethlehem rolled-steel wheels—75 at each mine. That company plans eventually thus to equip all its mine cars. Bell & Zoller Coal & Mining Co. at Zeigler, Ill., is providing all its cars with Sterling cast-steel wheels and Tyson and New Departure bearings.

Trolley locomotives have been installed in the main entry of the Crested Butte mine of the Colorado Fuel & Iron Co. in place of its rope haulage. The Northwestern Improvement Co., at Roslyn, Wash., which hauls all its coal by electric locomotives to the main slopes, still uses rope haulage outside the mine. At No. 3 plant it has an 8,200-ft. rope—the longest in the Washington field. Operating men of experience and ability are still of the belief that the rope has its advantages and that its possibilities have not been duly canvassed.

Conveyor Delivers to Aerial

At Otsego, W. Va., the Brule Smokeless Coal Co. brings the coal by conveyors from the face to a five-ton hopper outside the mine. This is set over a reciprocating-plate feeder, which delivers the coal to a batch loader holding about a ton of coal. The door of this loader is automatically tripped by the cars of an aerial tramway as they pass below the loader; thus they are loaded without stopping. The loader door is counterweighted to close after each tramcar clears the loading point, and the closing of this door actuates the reciprocating-plate feeder, thus recharging the loader. This line is equipped with 34 tramcars, each of 40 cu.ft. capacity with Timken roller-bearing wheels. Loading interval between cars is about 35 seconds. At the tipple end, the aerial tramway discharges directly to a hopper placed above the screens. The tramway is about 4,000 ft. long and will deliver hourly 100 tons of run-of-mine coal.

Another installation of similar type was completed during 1936 for the Midland Mining Co. at its Tribbey (Ky.) operation. The aerial tramway gives access to a new acreage, delivering coal from new workings to the present tipple. This tramway is about 1,100 ft. long and has an hourly capacity of 150 tons. Both these aerial installations were made by the Interstate Equipment Corporation.

A trackless-mining system with tractor-trailers running on rubber tires from mobile loaders at the face to a belt conveyor underground which delivers to the surface, at the Blue Bird Coal Co.'s mine, Carrier Mills, Ill., may be found described on p. 67 of this issue.

Propeller Fans Aplenty

Fans of improved construction have been introduced during the past year, among them the Aerodyne fan, which much resembles the disk fan but with the motor set in a streamlined casing in the center of the disk and with twelve radial airplane blades correctly designed to give the air a forward motion with minimal rotation, which the straight blades of the disk fan fail to do. What rotational velocity is imparted to the air by the blades is corrected by vanes which straighten out the flow before the relatively static air of the surface is reached. The reduction in installational costs of propeller fans decreases the total cost of such fans to about one-fourth that of previous centrifugal types. Several of these fans have been installed, notably by the Old Ben Coal Corporation, Island Creek Coal Co., Cambria Steel Co. and Melcroft Coal Co. The Utah Fuel Co. installed two Aerovane fans.

In the past year the Pittsburgh Coal Co. installed six Troller propeller-type fans; three were of 58-in. diameter driven by direct-connected 1,200-r.p.m. 5-hp. motors; another of the same diameter was driven by an 1,800-r.p.m. 10-hp. direct-connected motor. These fans are unique in that each has only a single double-bladed propeller. An 8-ft. propeller fan is under construction, also belt-driven. Several Hartzell propeller fans also have been installed, some of which were 10-hp. direct-connected units, 49-in. inside ring diameter and 55 in. over-all and some had belt drives 76-in. inside ring diameter and 84 in. over-all. These fans have propellers the tips of which extend beyond the ring, or fan orifice, through which the air passes, so that it cannot return along the fan casing and so recirculate.

By cutting off the west side of the mine, which was not needed for mechanical operation, and by placing a 6-ft. diameter V-belt-driven Aerodyne fan to ventilate the rest of the mine, a saving of $1,270 monthly

was made in its power bill by the Old Ben Coal Corporation at No. 11 mine. The new fan had a 75-hp. a.c. motor; the old one—a forward-bladed centrifugal fan—was belt-driven by two 150-hp. a.c. motors. The new fan had a water gage of 3.5 in. and gave 100,000 cu.ft. of air—all that was needed. The water gage of the old fan was 4.55 in., causing 118,050 cu.ft. of air to flow through the workings.

An original power input of 235 kw. dropped to 58.5 kw., which shows the economy that can be attained in some instances by proper provisions. The new fan is placed 200 ft. underground from the foot of the air shaft, and the old unit at the surface is ready to take up the service should anything happen to the new one. By putting fans underground, losses from recirculation in the shaft, often considerable, are avoided should the shaft walls leak and permit air to flow into or out of the shaft because of the difference in the pressure between the air at the surface and in the shaft.

Better Airways Cut Costs

At last the lesson seems to have been learned, at least by some companies, that better ventilation is best attained not by high pressure but by a large cross-sectional area, shorter and cleaner airways and better stoppings. But records of such improvements come mostly from companies which have been in the past most careful to keep these conditions favorable. Even they recognize that further improvement will afford further dividends. Thus the Pocahontas Fuel Co., Inc., has cleaned out and enlarged its airways; the Buckeye Coal Co., at Nemacolin, Pa., is periodically examining its mine to locate losses from "fugitive air"; the Sheridan-Wyoming Coal Co. has been cleaning airways, repairing brick stoppings in Acme and Monarch mines and building overcasts, and the Northwestern Improvement Co. at Roslyn No. 3, in Washington, is constructing a mine airway which will reduce the length of its main air circuits by two-thirds. A new fan will then be installed. Dawson Daylight Coal Co. also installed a new air shaft.

Completion of the drainage system of the Pocahontas Fuel Co.'s properties as far west as Dry Fork, in September of last year, constituted the year's greatest achievement in water control at bituminous coal mines. Though driven wholly in coal, except through a small fault and with some bottom lifted, and though winding to follow the required gradient, its careful planning by the sinking of boreholes, its great length (18.6 miles, including drainways already constructed), its driving in different directions and its construction from haulageways and airways, to be used later in the operations to follow in the areas drained, mark it as an unusual performance. Entries and crosscuts driven totaled 84.45 miles, coal from which totaled 1,321,000 tons. Unmined tonnage drained was 190,000,000. This development was fully described in the January issue of this year, p. 3.

Deep-well pumps, with motor on the surface and a long shaft connecting with an impeller or impellers in the mine workings, have taken a firm hold in the mining industry during the past year; the heavy spring floods made many companies install them. Thus the Koppers company installed a deep-well, 2,000-g.p.m. pump at Glen White mine, Mt. Hope, W. Va., with a 450-ft. lift driven by 4,000-volt a.c. current; the Humphreys Coal & Coke Co., Greensburg, Pa., installed four 16-in. deep-well turbine pumps with which it dewatered its mines; the H. C. Frick Coke Co. put two pumps of this type at Leisenring mine, Dunbar, Pa., and three at the Trotter mines, Connellsville, Pa., and there have been many other installations.

Mather Collieries, Mather, Pa., erected a two-bucket jig-back Interstate aerial-tramway rock-disposal system during the past summer. The self-dumping cars are of aluminum-alloy and have 110-cu.ft. capacity. Cars on entering the terminal are stopped, loaded and restarted in 8 seconds. The tramway is about 1,600 ft. long, operates at a speed of 1,000 ft. per minute and will move 150 to 250 tons per hour, depending on the distance the cars travel from the loading point. It handles all the mine rock and tipple refuse. As storage space is restricted, the track cables on this installation are raised to the top of a steel tower 250 ft. high, providing for the disposal of the waste of many years.

Automatic Bucket Loading

One of the two motor-driven feeders delivers the rock by a fly gate to a batch loader, set in a balanced cradle. When empty the batch-loader cradle is tilted slightly from the horizontal and when the feeder is set in motion, rock is delivered to the loader until the desired weight is deposited, whereupon the cradle moves to a horizontal position actuating a switch which moves the fly gate so that it will feed another batch loader. The batch loaders are mounted immediately over the loading points of the tramcars, so that when a car reaches the loading point, it trips the loader gate, and the rock slides directly into the aerial tramcar, which is then ready to travel along its cable track to the desired discharge point. As the tramcar leaves its loading point it actuates a starting switch to the feeder motor again, repeating the cycle.

Slate-handling aerial tramways were rebuilt by the Interstate Equipment Corporation at the Helen (W. Va.) and Grant Town (W. Va.) installations of the Koppers Coal Co. In the latter instance, a pivoted steel structure 110 ft. high was added to the top of an existing steel tower 125 ft. high. The original plant was erected in 1928 and is of the two-bucket reversible type arranged for manual loading.

Would Save Shaft Troubles

Trouble with shaft linings is awakening new interest. A little water behind the lining will do almost as much damage as a larger quantity if the water freezes. As it cannot be completely excluded, it should be piped away so that it cannot freeze, unless the shaft is an exhaust or is heated in the winter. A. W. Hesse described in the November, 1936, issue, p. 511, how the water in Brier Hill shaft was controlled by putting trenches in the shaft wall down to the water ring, covering them with welded wire fabric and gunite. Two shafts have been relined in the past year by R. G. Johnson Co. with brick facing, one for Mather Collieries and one for the Harwick Coal & Coke Co. at Harwick, Pa. In both of these provision was made for the control of the water. A shaft is being sunk by the Republic Steel Corporation at its Sayreton (Ala.) mine, where it will install a new fan and in other ways improve the mine ventilation.

At the Dawson Collieries, Dawson Springs, Ky., an 18-deg. slope portal has been constructed with ¼-in. Armco steel tunnel lining having a 16-ft. span. This lining is covered with concrete. The slope is 450 ft. long and descends to a to a depth of 225 ft. below the surface.

In Wyoming, Governor Miller called a meeting on Dec. 7 of coal operators, State mine inspectors and United Mine Workers officers for consideration of improved plans for greater safety. On Dec. 16, at a meeting at Rock Springs, definite

steps were taken toward a furtherance of safety effort. Electric mine lamps, hard hats, protective goggles and safety shoes are becoming general in Wyoming; many mines are already equipped and others are preparing to do so. The Union Pacific Coal Co. in the first ten months of 1936 showed an increase in man-hours of exposure per mine accident of 69.5 per cent over the same period in 1935.

In Alabama, the Alabama By-products Corporation provided guards for 30,000 ft. of trolley wire, established several inside first-aid stations, installed guards on moving machinery, provided a large number of car stops, derailers, etc., and shelter holes along its haulageways. The Utah Fuel Co. has extended the use of protective goggles so that now all its employees are using them. American Optical Co. Ful-Vue goggles are used. About one-third of all the mines in the State of West Virginia are equipped with protective headgear. At 80 mines in that State, no soft-toed shoes are used.

A new W-8 methane detector was introduced by the Mine Safety Appliances Co. which is lighter, less bulky and simpler than the older Type AP-6. A low-velocity electrical anemometer is about to be introduced. Current is supplied to the anemometer through two platinum filaments inclosed in a wire-gauze bonneted head from the same standard Edison Model K battery which furnishes current to the lamp headpiece. The cooling effect of an air current on one of the platinum filaments unbalances a Wheatstone bridge circuit and sets up a potential that registers on a meter calibrated in feet-per-minute velocity. It will register, with accuracy, air speeds of 25 ft. per minute, whereas with the conventional vane-type anemometer, 100 ft. per minute is the lower limit. A new air-line respirator for use in high dust concentrations has been developed. Equipped with a new type of air deflector in the face piece, it gives greater wearing comfort and incorporates a filter cartridge at the end of the breathing tube to remove objectionable vapors from the air supply. A bump-proof control valve affords assurance that the setting will not be accidentally disturbed.

Derailers and car stops that fold on a hinge over the top of the rail, improved skids for use under a wheel, knee pads of soft sponge rubber that fit over the knee cap so that dirt cannot enter, and a safety malleable-steel room-rail splicer have been developed by the Portable Lamp & Equipment Co.

At the mines of the Hillman Coal & Coke Co. "electric eyes" have been used to notify the hoisting engineer whether the loaded car is properly placed on the cage before he starts the hoist. These eyes are placed so near the cage that if the car is not in place the light will be obstructed, and the lamp in the hoist room will not light. If the "electric eyes" are darkened by dust, the hoisting engineer receives no signal, but in that case he does not attempt to hoist, so only time is lost and no damage is done.

MECHANIZATION

+ Hangs Up New Records in 1936

GATHERING momentum from the continued drive to keep costs at relatively low levels to retain and widen markets in the face of higher wages and shorter hours, mechanization of loading at bituminous mines reached a new high in equipment installed and tonnage handled in 1936. Interest was centered largely on the two major types of equipment commonly included in the mechanization group: mobile loaders and conveyors of various types. Pit-car loaders still were used in large numbers, but available data indicate at least a decrease in number in service if not also in the tonnage they handled in 1936. Little change was discernible in the scraper-loading picture.

Estimated installations of 345 mobile loaders and 590 conveyors of all types evidence the strides made in mechanization in 1936. In the mobile-loader field, reports indicate, West Virginia led the list with 102 machines (Table I). On the other hand, Illinois, one of the earliest regions to mechanize on a large scale, added 96 machines to the number already in operation. Pennsylvania ranked third, with 66 machines; Ohio and Indiana, fourth and fifth, with 22 and 21 loaders, respectively. Lesser numbers, either for new programs or as additions to the list already in use, were installed in other Eastern and Southern States and in the Rocky Mountain region. The 1936 installations, it is estimated, will add approximately 10,000,000 tons to the mobile-loader output in that year. West Virginia also led in new conveyor installations in 1936 (Table II), and considerable activity was recorded in other Eastern and Southern States. In addition, conveyors also registered substantial gains in Indiana and Iowa in the Middle West and Colorado in the Rocky Mountains.

Installations of mobile loaders in 1936 reflected the widening of the range of seam heights and loading capacities made possible by progress in design in the last two or three years. Reports from various districts include the following examples: Sheridan-Wyoming Coal Co., five additional Joy 5BU loaders; Freeman Coal Mining Co., Herrin, Ill., Jeffrey L-400 and 44-type machines; Old Ben Coal Corporation, No. 11 mine, Christopher, Ill., five Goodman loaders; St. Louis & O'Fallon Coal Co., O'Fallon, Ill., Umeco loaders; Hanna Coal Co., Willow Grove and Dun Glen mines, eastern Ohio, Whaley Automat loaders; Sonman mine, Sonman Shaft Coal Co., which now is controlled by the Koppers Coal Co., two 8BU machines; New Castle Coal Co., Alabama, 7BU type; West Virginia Coal & Coke Corporation, Logan County, West Virginia, 11BU and Whaley Automat loaders for high coal and Joy, Jr., machines for thin coal; Glen Cambria mine, Mountain

Fuel Co., and Federal No. 3 mine of the Koppers Coal Co., northern West Virginia operations, two 11BU and five 11BU loaders, respectively. The 11BU type was exceeded in numbers by the 7BU in northern West Virginia, however, which also installed 10BU, 8BU, Jeffery 44-D and Whaley Automat units. Activity in northern West Virginia was an important element in the showing made by that State in 1936.

Gay Mines Fully Mechanized

Increased tonnage through the use of mobile-loader equipment attracted the attention of several producers in 1936, together with the possibility of multipleshift operation—adopted by an increasing number of companies. The Gay Coal & Coke Co., Mt. Gay, W. Va., mechanized both its mines 100 per cent in 1936. All coal at No. 1, with a seam thickness of 6 ft., was loaded by machines, and starting June 1, all coal at No. 2, where the thickness is 4 ft., was produced mechanically, this step involving power drilling, use of shotfirers and other measures necessary in full-mechanical mining. Bearing on the question of increasing output, this company reports: "Mechanical loading enabled us to produce 48 per cent more coal this year than in our previous best year."

Although mobile loaders designed to fit still thinner seams were installed in increasing numbers, a search for equipment similar to that used in a thick seam was conducted by some operators with coal still lower than that now classed as minable with the conventional mobile equipment.

From the standpoint of mining methods, the year 1936 brought some disposition to depart where possible from the standard room-and-pillar system hitherto, with one or two exceptions, generally employed with mobile loaders. But, despite these departures, room-and-pillar mining still continued as the predominant method of attack with, in the East and South, the mining of pillars as an added task for the loader, as compared with general practice in the earlier mechanized fields, where pillars either are left in place or are mined by hand. Utah practice in 1936 was distinguished by an intensification of the trend, where physical conditions permit, toward loading entry, room and pillar coal with mobile units.

Extension of the practice of using track-mounted cutting machines with adjustable height bars to remove impurity bands as a preliminary to loading the coal mechanically was another 1936 development. In mechanizing its Omar No. 5 mine last year, the West Virginia Coal & Coke Corporation, as an example, installed turret-type cutters for making double or triple cuts to remove impurities about the center of the seam (*Coal Age*, December, 1936, pp. 551-556). These cuttings either are thrown into the gob by hand or are loaded out with a loading machine. In other cases, cuts are made at the top of the seam to eliminate rash or boney material which otherwise would be shot down with the coal.

Table I—1936 Installations of Mobile Loaders at Bituminous Coal Mines, by States

State	In Use in 1935*	Installed in 1936†	Total in Use in 1936†
Alabama	‡	9	‡
Colorado	‡	2	‡
Illinois	319	95	414
Indiana	123	21	144
Kentucky	‡	5	‡
Montana	28	2	30
New Mexico	‡	3	‡
North Dakota	‡	.....	‡
Ohio	27	22	49
Pennsylvania	41	65	106
Tennessee	‡	.....	‡
Utah	37	7	44
Virginia	‡	7	‡
West Virginia	38	102	140
Wyoming	22	5	27
Undistributed	22	.....	48
Total	657	345†	1,002†

* U. S. Bureau of Mines. † Estimate based on reports of shipments in 1936. ‡ Included in total.

While extraction of pillars with loading machines was sharply extended, a few operators adopted long-face mining systems in 1936. Included in the group, it is reported, was the New Castle Coal Co., Alabama, employing conveyors for transportation, as compared with track and cars in the few earlier projects of this type, of which the first was that of the Gay Coal & Coke Co., in 1913. Use of conveyors as a transportation medium in room-and-pillar mining with mobile loaders also was characterized by an increase in installations in 1936, largely in Pennsylvania, West Virginia and Kentucky.

Table II—1936 Installations of Conveyors of All Types at Bituminous Coal Mines, by States *

State	Number Installed
Alabama	34
Arkansas	9
Colorado	49
Illinois	3
Indiana	15
Iowa	23
Kentucky	32
Maryland	1
Ohio	47
Oklahoma	1
Pennsylvania	75
Tennessee	12
Utah	5
Virginia	31
Washington	2
West Virginia	235
Wyoming	16
Total	590

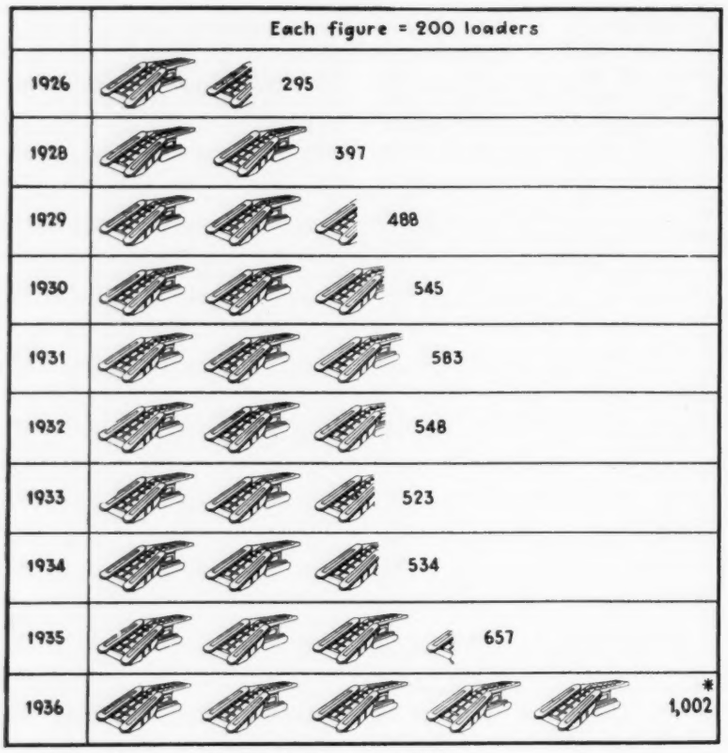
* Estimate based on reports of shipments in 1936. Does not include pit-car loaders or conveyors used in connection with mobile loading machines.

Loader-conveyor combinations were primarily of the trackless-mining type pioneered by the Goose Creek Mining Co., Hueysville, Ky., in 1935. However, whereas Goose Creek and some succeeding installations, including that of Earl J. Jones, Zanesville, Ohio, were built around completely conveyorizing movement of the coal from the face to the tipple, other 1936 installations—in already developed mines—were based on installing a loader-conveyor unit in a panel, from which the coal is hauled to the outside in mine cars. An example was the 1936 project of the West Virginia Coal & Coke Corporation, Stirrat No. 19 mine, in which the main belt conveyor taking coal from the chain-and-flight units serving Joy, Jr., loaders discharges into cars at the mouth of the panel (*Coal Age*, December, 1936, pp. 551-553). And while the majority of the loader-conveyor combinations have been designed around loading units built for low coal, the principle was quickly extended to thicker coal and higher-capacity machines in 1936, with installations, either actual or proposed, in the Eastern and Southern fields and the Middle West.

Eliminating Mine Track

With the development of a new transportation unit, a new trackless-mining system made its bow in Illinois in 1936. In this system, developed by James H. Fletcher, consulting engineer, Chicago, who has applied for patents, the transportation unit is the connecting link between mobile loaders at the face and a belt system carrying the coal to the outside or to a mine-car loading station, depending upon conditions. One such system was in operation at a property of the Blue Bird Coal Co., Carrier Mills, Ill., throughout the last half of the year, the belt conveyor delivering to the surface, and additional systems were in process of installation at properties of the Hart Coal Corporation, Mortons Gap, Ky., and the Moffat Coal Co., Sparta, Ill.

The new transportation unit consists of a battery-powered tractor with rubber tires to which is attached by means of a swivel coup-



* Based on an estimate of shipments in 1936.

Mobile loaders in service have increased approximately four times in eleven years

ling a two-wheeled bottom-dumping trailer. Front wheels on the tractor, which is steered like an automobile, are equipped with single tires; rear wheels on the tractor and the trailer wheels are equipped with dual tires. Tractor and trailer run on the mine floor.

Under the new system, in essentials, a block of coal is developed by driving an entry along its center line. The conveyor is installed in a heading of this entry. Working places are turned to the right and left off the entry, and the development plan is such that a succession of long faces are created, along which caterpillar-mounted loaders operate. The tractor-trailer units pull coal from the loaders to the dumping station at the inby end of the belt conveyor. As the workings move away from the dumping point, extensions are added to the conveyor to keep the haul between the dump and the face within the desired limits.

Activity in mining bituminous coal with conveyors of either the hand-loaded or self-loading types kept pace with activity in the mobile-loader field. Installations were made throughout the United States from Alabama and Virginia in the South to Washington in the West. More economical extraction of thin coal was the primary objective of the majority of installations, with recovery of seams where the pitch is too light to let the coal run and yet too heavy for the use of mine cars as the principal purpose in certain regions. Additional equipment was added in districts where conveyor mining already was an accepted method, while a number of new fields were included in the conveyor list in 1936.

In Washington, it is reported, the last year saw complete mechanization of the Roslyn Field. The Northwestern Improvement Co. had in service 54 shaker conveyors, 31 shortwall mining machines, two shearing machines and the necessary compressed-air and electric drills. All equipment is of the permissible type. A similar program of mechanization was carried out by the Roslyn-Cascade Coal Co., and as a result practically no hand-mining is being done in the field.

Utah, a newcomer to the conveyor group as a result of increased interest in the thinner seams of that State, increased its use of conveyor equipment. Following the example of the Peerless Sales Co., which pioneered the use of shaker equipment in the State at its No. 3 mine, a number of companies working coal 5 ft. or less in thickness have adopted this type of equipment together with Cardox, so that coal can be broken down on the shift. The Peerless organization supplemented its shaker equipment with chain-and-flight-type units in anticipation of a special set-up with chain-and-flight equipment in the dip area in the mine in 1937.

Wyoming, which uses shaker conveyors in large numbers and originated the self-loading head, added to equipment in service in 1936. A number of Colorado companies carried on conveyor operations in 1936, in most cases of an experimental nature. Included in the list were the Colorado Fuel & Iron Co., Nonac mine, two shaker units, and the Moffat Coal Co., one experimental conveyor unit.

Iowa Tries Flight Conveying

In Iowa, the Scandia Coal Co., in an attempt to find some method of producing coal more economically and thus offset competition from the increasing number of truck, or "dog-hole," operations, purchased early in 1936 a Jeffrey chain-and-flight unit and started experimenting with the possibility of conveyor mining, in the course of which the company was notified by the union that no men would be permitted to stay in the mine if shooting on the shift was done, even though Iowa has no law prohibiting the practice. Experimentation was carried out at the No. 6 mine during the summer and in the autumn the unit was moved over to the No. 4 mine and two additional units were purchased. Attempts to draw back pillars were found to be uneconomical, and now rooms are driven 35 ft. wide to a depth of 200 ft., leaving 18-ft. pillars, which are slabbed back. Rooms only are being driven at present, but it is believed that with more experience it will be possible to drive entries. The coal is undercut to a depth of 6 ft. and is shot with pellet powder. Snubbing is done by using shots with shorter fuses than the other shots. Three rooms are worked as a unit with one loading point.

"It is too early," the company states, "to tell whether or not conveyor loading will be a success in Iowa, but we have learned that coal can be mined satisfactorily with the aid of chain conveyors, that a greater percentage of extraction of the seam can be secured and that bad spots in the roof, such as rolls and slips, can be handled even more satisfactorily than by the old method of shooting off the solid. We also

feel that, due to close supervision, accidents are fewer in conveyor work than in solid-shooting work."

Following the conclusion of experiments on the application of shaker conveyors to a 750-ft. section of an advancing longwall face, the Macon County Coal Co., Decatur, Ill., installed a second conveyor unit in 1936 as the next stage in a program looking toward eventual complete mechanization with this type of equipment. Experimental work started in June, 1935. Under the Macon County system, a conveyor unit consists of a chain-and-flight elevator for loading mine cars fed by a shaker-type mother conveyor receiving coal from two 383-ft. (extensible to 403-ft.) shaker-type face conveyors, all of the Ladel type. The face conveyors bring coal from each side to the mother conveyor in the center of the 750-ft. section of coal face being worked. The major advantage is a substantial reduction in the number of "branches," or rooms, which have to be kept open to serve the longwall face through territory from which the coal has been completely extracted. A description of the Macon County work is scheduled for the March issue.

Activity in conveyor installation in the East and South increased last year, with many new installations as well as additions in fields such as central Pennsylvania, where this type of equipment was early installed. While chain-and-flight units predominated in rooms, shaker and belt units also made gains. Examples of installations of various types include the following: Tennessee Coal, Iron & R.R. Co., Alabama, Goodman shaker and auxiliary equipment, in addition to purchases of this and other types of equipment by the New Castle Coal Co., the Alabama By-Products Corporation and others; Berger Coal Mining Co., LeJunior, Ky., Darby, or No. 5, seam mine, conveyor mining adopted Oct. 1; Koppers Coal Co. (Powellton division), Powellton (W. Va.) No. 3 mine, Goodman shaker; Koppers Coal Co. (C.C.B. division), Glen White and Stotesbury, W. Va., four Jeffrey room conveyors each.

Mechanical mining of the No. 6 Pocahontas seam in the Winding Gulf district of West Virginia got under way in the last days of 1936 with the completion of a $75,000 development program by the Leccony Smokeless Coal Co., Besoco, W. Va. In view of the low height of the seam (28 to 36 in.), company engineers decided that it would be more economical to carry the coal from the face to cars on the main entries by belt conveyors. A combination of Jeffrey and Link-Belt equipment was installed. The seam is characterized by a good top and no partings. With the additional tonnage provided by the new development, annual output of the company is expected to be in excess of 500,000 tons, and the No. 6 development is laid out so that, if necessary, output can be stepped up to 750,000 tons.

While a number of individual room conveyors, particularly of the shaker type, were installed in the East and South, most operators employed the unit system characterizing developments in recent years. The same was true in the Middle West—vide the Scandia Coal Co. development outlined above and the older Submarine No. 2 installation of the Clinton Coal Co., in Indiana. In many instances of adoption of the unit system, the coal from a group of three, four or six places, etc., is brought to one point either by cross conveyors moved up at intervals as the rooms advance or by mother conveyors laid alongside the track in the room heading. In other cases, units are incorporated in a trackless-mining set-up in which the coal is taken from the face to the surface entirely by conveyors, as at the Otsego (W. Va.) mine of the Brule Smokeless Coal Co. At Otsego, the main conveyor dumps into a hopper feeding an aerial tramway which completes the transportation cycle to the tipple.

In Indiana, increased interest in conveyor mining brought up the problem of finding an economical method of breaking down coal on the shift that would meet restrictions embodied in recent legislation. Suggestions under consideration included hydraulic cartridges and mechanical coal breakers.

BITUMINOUS PREPARATION

+ Registers Gains in Capacity and Methods

GROWTH in the consumption of junior sizes and widened stress on removal of impurities featured bituminous preparation activities in 1936. The trend toward junior sizes was evidenced by the numerous rescreening plants installed during the year and the interest in cleaning by the many mechanical cleaning units or plants built for beneficiating one or more sizes up to the entire output of a mine. Increased use of wet-washing equipment was accompanied by a corresponding activity in drying, with heat-type installations in the lead. Domestic stoker growth was reflected in a number of installations of dedusting and crushing equipment. Dustless treatment of coal, particularly of the stoker type, registered a substantial gain.

Wet-washing practice last year was marked by a growing tendency toward increasing the top size cleaned. Included in 1936 contracts were the following plants for mechanically cleaning 6x0-in. coal: Little John Coal Co., Victoria, Ill., Jeffrey Baum-type jigs, and the Southwestern Illinois Coal Corporation, McNally-Pittsburgh coal-washing equipment. In the combination plant of the Island Creek Coal Co., No. 7 mine, Holden, W. Va., Rheolaveur equipment is used for 5x¼-in. coal and six American pneumatic separators for the minus ¼-in. size.

In most wet-washing plants, how-

ever, the top size did not exceed 4 in., while several installations took in only 3x0-in. coal. And in the new plant of the Central State Collieries, St. David, Ill., employing a Link-Belt-Simon-Carves washer, the limit has been set at 2 in. Like many other recent installations, however, the Central State plant is designed to permit adding washing capacity and increasing the size range. At the other end of the scale were two Rheolaveur fine-coal washers installed at the Farmington (Ill.) plant of the Midland Electric Coal Corporation to clean slurry and crushed refuse from the secondary refuse elevators of two Baum-type jigs.

Wash Their Six-Inch Coal

Among the objectives in increasing the size of coal mechanically cleaned was reducing the cost of hand picking. Coupled with the growing trend away from extremely large coal, this revision in practice has resulted in at least two-plants—Snow Hill, 1935, and Little John, 1936—in adoption of a preparation schedule based on reducing the entire mine output to 6 in. and washing it, either before or after screening.

Strip operations continued well up in the front ranks in the installation of mechanical-cleaning equipment in the Middle West and Southwest in 1936. Among deep-mine installations were: new Link-Belt tipple and washery, Moffat Coal Co., Sparta, Ill., and a Link-Belt-Simon-Carves washery, Peabody Coal Co., Harco, Ill., equipped with Algar dedusters in 1934.

While several large-scale plants were constructed (see above and also the construction summary on p. 71), operators in the East and South largely concentrated on units for cleaning one size—in a few cases, two or three. Examples of wet-washing equipment for screened sizes included: Koppers Coal Co. Stanaford, W. Va., three Fuel Process chloride washers for stove and nut; Gay Coal & Coke Co., Mt. Gay, W. Va., Wilmot-Simplex jig, 3x1¼-in. stove (arrangements made for installing equipment to clean stoker sizes); Koppers Coal Co., Helen, W. Va., Menzies cone separator for, at present, stove and nut, in addition to pea if desired, replacing two other wet units; Peerless Coal & Coke Co., Vivian, W. Va., Menzies hydroseparator, 2½x½-in. coal; Penn Central Light & Power Co., Saxton, Pa., two Llewellyn washers, 2¼x¼-in. coal, with facilities for crushing and re-treating rejects from the second compartments of both washers; Pittsburgh Coal Co., Pittsburgh, Pa., Menzies hydroseparator, 4x1-in. coal.

In addition to other projects, several Alabama and Tennessee companies adopted wet tables, usually for minus ⅜-in. coal. The Alabama By-Products Corporation, for instance, installed several Deister-Overstrom "Diagonal-Deck" coal-washing tables and also vibrating screens for preparing byproduct oven coal and additional jig equipment. Similar tables were installed by the Tennessee Consolidated Coal Co., Palmer, Tenn., for 1x⅜- and ⅜-in. x 20-mesh coal, preceded by a Leahy "NO-Blind" vibrator for the ⅜-in. and 20-mesh separations. A revision and modernization program involving several thousand dollars at the Boothton (Ala.) operations of the Southern Coal & Coke Co. also included table equipment.

Air-cleaning units installed for coal from ¼ up to 2 in. in size in 1936 included: Heisley Coal Co., Nanty-Glo, Pa., Stump "Air-Flow" cleaners, minus ¼-in.; High Splint Coal Co., Hilo, Ky., American pneumatic separators, minus 2-in.; and other Stump units, as follows: Monroe Coal Mining Co., Revloc, Pa., minus 1¼-in.; Raven Red Ash Coal Co., Inc., Red Ash, Va., as part of screening, treating and cleaning program, minus ¾-in.; and the Union Colliery Co., Dowell, Ill., minus 2-in. coal.

Combination plants were confined largely to southern West Virginia, where Jeffrey Baum-type jigs, 4x½-in. coal, and Stump "Air-Flow" cleaners were adopted by the Kingston Pocahontas Coal Co., Hemphill. Adding to its list of mechanical-cleaning plants (February, 1935, *Coal Age*, p. 68), the Island Creek Coal Co. installed in 1936 the No. 7 Rheolaveur-American separator plant noted above. Island Creek also purchased Stump equipment for minus ½-in. coal at its No. 22 plant, originally wet washing.

Circumventing Jack Frost

Wet coal continued as preparation problem in 1936. While a number of operators of wet-washing plants dewatered washed fines on high-speed shakers or vibrators and used calcium chloride or other chemicals to prevent freezing, others went to heat or mechanical drying. In the Roslyn field of Washington, where mechanical-preparation plants were installed in 1935 by the Northwestern Improvement Co. (Vissac jigs and American tables) and the Roslyn-Cascade Coal Co. (McNally-Norton washing equipment), Rugles-Cole dryers were employed by the latter company. The 825-tons-per-hour plant of the Sahara Coal Co., Harrisburg, Ill. (McNally-Norton washers, 6x0-in. coal), which went into operation in 1936, included three Christie dryers for $\frac{5}{16}$x0-in. material.

At its new Willow Grove (Ohio) plant, the Hanna Coal Co. last year installed a heat-drying plant (40 tons per hour) based on the new Link-Belt "Roto-Louvre" dryer (*Coal Age*, November, 1936, p. 534). Freezing of equipment in preparation plants also presents an operating problem, and in 1936 Hanna equipped its wet plants with Dravo-Doyle Lee direct-fired heaters of the hot-air type. In Illinois, the Delta Coal Mining Co., Carrier Mills, was installing a "Roto-Louvre" drying plant with a capacity of 90 tons per hour at the end of the year.

Less Water Runs to Waste

Increasing restrictions on stream pollution and a desire to save coal values were reflected in an increase in interest in wash-water clarification and sludge recovery in 1936. Indications were that the desired objective eventually will be a closed system with filters and no water running to waste. Several plants experimented during the year with the use of flocculents to facilitate clarification with the idea of reducing the size of the system or making it more efficient.

Activity in plants for the preparation of coal by screening and hand-picking continued at a relatively high level in 1936, with emphasis on increased flexibility in screening, mixing and loading, and on auxiliary crushing equipment and vibrators for the junior sizes. As an example, the Knife River Coal Mining Co., Beulah, N. D., installed a new all-steel tipple with four loading tracks and facilities for loading five preparations at a time. Equipment includes coal breakers for the larger sizes, other crushers for eight different preparations, if warranted by market conditions, and Ottumwa scraper-line box-car loaders with tilting frames for all preparations.

Provisions for making five primary sizes and 38 combinations were included in the new tipple of the Jones Collieries, Inc., Rachel, W. Va. Equipment includes belt loading booms, tramp-iron magnets, picking tables, mercury lights, dust collectors, automatic weighing equipment and vibrating screens for making the junior sizes fed by a 15-in. L-type Redler conveyor-elevator for

reducing degradation. A belt system and storage bins permit supplying any size to the local trade.

In addition to plants to better serve present markets, other 1936 installations provided new outlets, as, for instance, the new three-track tipple of the Dawson Daylight Coal Co., Dawson Springs, Ky., which enables that operation to serve commercial as well as railroad markets. Dawson Daylight also installed a four-track empty-storage yard for railroad cars and is making preparations for a rescreening plant.

Movable Picking Tables

Innovations in tipple equipment last year included a retractile picking table installed in the Morrow-built plant of the Red Jacket, Jr., Coal Co., Wyoming, W. Va. (*Coal Age*, July, 1936, p. 278). These tables with degradation screens on the discharge ends, are mounted on wheels to permit rolling them back from the loading boom to discharge into a mixing conveyor. In the Jeffrey-built plant of the Harvey Coal Corporation, Harveyton, Ky. (January *Coal Age*, p. 12), the mixing conveyor is placed between the picking tables and the loading booms and the space is bridged by a chain-mat rescreening conveyor.

Aside from rescreening or rescreening-and-dedusting plants, crushers, and dustless-treating systems, revisions in existing plants covered a wide range of equipment. Examples at random include: Franklin County Coal Co., Inc., Illinois, picking-table and other tipple equipment, Gyrex vibrator and Ottumwa box-car loader; Central Illinois Coal Mining Co., Springfield, Ill., retail coal plant; Will County Coal Co., Braidwood, Ill., Robins mine-run belt conveyor, transfer chute with lip screen and belt loading boom; Wheeling Township Coal Mining Co., Adena, Ohio, Fairmont refuse-disposal plant, including steel trestle, belt and scraper conveyors, electric hoist and rock larry; Koppers Coal Co., Midvale No. 2, Gamoca, W. Va., screening plant, three sizes. Koppers also installed ten layer-loading hoists in 1936, in which year the Brown-Fayro HKI unit, handling three to seven railroad cars, was brought out. With stocking coal to iron out variations in output a success at the Dehue (W. Va.) mine, Youngstown Mines Corporation, plans were made for equipment at the Nemacolin (Pa.) mine of the Buckeye Coal Co., another Youngstown Sheet & Tube Co. subsidiary.

Crusher installations were almost a matter of course in new hand- and

New Bituminous Preparation Facilities in 1936*

Coal Company	Plant Location	Capacity, Net Tons per Hour	Preparation Equipment
Alabama By-Products Corporation	Praco, Ala.	42	Deister Concentrator [1]
Alston Coal Co.	Minden, Mo.	225	McNally-Pittsburg [2]
Binkley Mining Co. of Missouri	Bevier, Mo.	400	McNally-Pittsburg [2]
Central Illinois Coal Mining Co.	Springfield, Ill.	150	Link-Belt
Central State Collieries, Inc.	St. David, Ill.	450	Link-Belt [3]
Clear Fork Coal Co.	Fonde, Ky.	300	Fairmont
Colcord Coal Co.	Montcoal, W. Va.	50	Wilmot [4]
Consolidated Coal Co.	Saginaw, Mich.	100	Link-Belt
Consolidation Coal Co. (No. 155)	Van Lear, Ky.	280	Fairmont [5]
Consolidation Coal Co. (No. 204)	Jenkins, Ky.	150	Fairmont
Cornett-Lewis Coal Co	Louellen, Ky.	140	Jeffrey [6]
	Louellen, Ky.	250	Morrow [7]
Crummies Creek Coal Co.	Crummies, Ky.	300	Jeffrey
Dawson Coal Co.	Clarksburg, W. Va.	400	Fairmont
Dawson Collieries	Dawson Springs, Ky.	150	.....
DeBardeleben Coal Corporation	Empire, Ala.	7	Deister Concentrator [1]
Delta Coal Mining Co.	Carrier Mills, Ill.	90	Link-Belt [8]
Elkhorn Coal Co.	Kona, Ky.	125	Morrow [5]
Elk River Coal & Lumber Co.	Widen, W. Va.	100	Link-Belt [3]
Franklin County Coal Co.	Herrin, Ill.	320	Link-Belt
	Royalton, Ill.	300	Link-Belt
Gay Coal & Coke Co.	Mt. Gay, W. Va.	40	Wilmot [10]
Gay Coal & Coke Co. (additions)	Mt. Gay, W. Va.	150	Link-Belt
Hanna Coal Co.	Willow Grove, Ohio	40	Link-Belt [8]
	Dun Glen, Ohio	250	Morrow [5]
Harlan Central Coal Co.	Totz, Ky.	300	Link-Belt
Heisley Coal Co.	Nanty-Glo, Pa.	50	Roberts & Schaefer [11]
Hickory Grove Coal Mining Co.	Dugger, Ind.	300	Jeffrey [6]
High Splint Coal Co.	Hilo, Ky.	400	American, Morrow [12]
Howard Collieries Co.	Williamson, W. Va.	300	Roberts & Schaefer
Independent Coal & Coke Co.	Kenilworth, Utah	160	Link-Belt
Island Creek Coal Co. (No. 7)	Holden, W. Va.	116	American [13]
	Holden, W. Va.	400	Koppers-Rheolaveur [14]
Island Creek Coal Co. (No. 22)	Pine Creek, W. Va.	160	Roberts & Schaefer [11]
Johnstown Coal & Coke Co.	Johnstown, Pa.	150	Link-Belt
Jones Collieries, Inc.	Rachel, W. Va.	300	.....
Kingston Pocahontas Coal Co.	Hemphill, W. Va.	175	Jeffrey [15]
	Hemphill, W. Va.	50	Wilmot [4]
Knife River Coal Mining Co.	Beulah, N. D.	250	Link-Belt
Koppers Coal Co.	Helen, W. Va.	100	Koppers-Rheolaveur [16]
	Long Branch, W. Va.	70	..... [17]
	Stanaford, W. Va.	90	Fuel Process [9]
	Wharton, W. Va.	450	McNally-Pittsburg
Leslie Larsen & Co.	Madisonville, Ky.	175	Morrow
Little John Coal Co.	Victoria, Ill.	400	Jeffrey [6]
Maumee Collieries Co.	Clay City, Ind.	300	.....
	Keller, Ind.	300	..... [18]
Mead Smokeless Coal Co.	Mead, W. Va.	130	American [19]
Midland Electric Coal Corporation	Farmington, Ill.	70	Koppers-Rheolaveur [20]
Moffat Coal Co.	Sparta, Ill.	250	Link-Belt [3]
Monroe Coal Mining Co.	Revloc, Pa.	275	Roberts & Schaefer [5]
	Revloc, Pa.	90	Roberts & Schaefer [11]
Montevallo Coal Mining Co.	Montevallo, Ala.	200	Jeffrey [21]
New Byrne Coal Co.	Byrne Stop, W. Va.	75	Jeffrey [5]
New River & Poca. Cons. C. & C. Co.	Minden, W. Va.	300	Fairmont [5]
Oakwood Smokeless Coal Co.	Hanger, Va.	300	Kanawha
Old Ben Coal Corporation	Buckner, Ill.	50	Fuel Process [22]
Peabody Coal Co.	Harco, Ill.	200	Link-Belt [3]
Peerless Coal & Coke Co.	Vivian, W. Va.	85	Roberts & Schaefer [17]
Penn Central Light & Power Co.	Saxton, Pa.	120	Pittsburgh C. W. [23]
Pittsburgh Coal Co.	Pittsburgh, Pa.	100	Roberts & Schaefer [17]
Princess Dorothy Coal Co.	Eunice, W. Va.	175	Fairmont
Pschirrer & Sons Coal Co.	Canton, Ill.	150	.....
Raleigh-Wyoming Mining Co.	Glen Rogers, W. Va.	50	Fuel Process [22]
Raven Red Ash Coal Co., Inc.	Red Ash, Va.	50	Roberts & Schaefer [11]
Shirley Gas Coal Corporation	Zelienople, Pa.	100	.....
Southern Coal & Coke Co.	Boothton, Ala.	7	Deister Concentrator [24]
Southwestern Illinois Coal Corporation	Percy, Ill.	600	McNally-Pittsburg [2]
Stonega Coke & Coal Co.	Derby, Va.	200	Koppers-Rheolaveur [25]
Superior Coal Co. (No. 3)	Mt. Claire, Ill.	570	Link-Belt
Sycamore Coal Corporation	Patterson, W. Va.	300	Link-Belt
Tennessee Consolidated Coal Co.	Palmer, Tenn.	20	Deister Concentrator [1]
Twentieth Century Coal Co.	Winslow, Ind.	50	Deister Concentrator [26]
Union Colliery Co.	Dowell, Ill.	50	Roberts & Schaefer [11]
Union Pacific Coal Co.	Reliance, Wyo.	500	Allen & Garcia
United Pocahontas Coal Co.	Crumpler, W. Va.	50	Link-Belt [27]
United States Coal & Coke Co.	Ream Station, W. Va.	600	Link-Belt
Virginia & Pittsburgh Coal & Coke Co.	Rivesville, W. Va.	250	Fairmont
Westmoreland Mining Co.	Blairsville, Pa.	100	Roberts & Schaefer [11]
Will County Coal Co.	Braidwood, Ill.	150	Robins

* Also includes rebuilt plants and major installations of preparation equipment in existing structures.

[1] Deister-Overstrom "Diagonal-Deck" coal-washing tables. [2] Including McNally-Pittsburg coal-washing equipment. [3] Including Link-Belt-Simon-Carves coal-washing equipment. [4] Wilmot-Menzies hydroseparator coal-washing equipment. [5] Rescreening plant. [6] Including Jeffrey Baum-type-jig coal-washing equipment. [7] Including Tyler vibrators. [8] Link-Belt "Roto-Louvre" washed-coal drying plant. [9] Three chloride washers at 30 tons per hour each. [10] Wilmot-Simplex jig equipment. [11] Stump "Air-Flow" coal-cleaning equipment. [12] Capacity of American pneumatic separators, minus 2-in. coal, 100 tons per hour. [13] Six American pneumatic separators, minus ¼-in. coal. [14] Rheolaveur coal-washing equipment for 5x¼-in. coal; tonnage given is total for plant, including American pneumatic separators. [15] Capacity given is that of the Jeffrey Baum-type-jig equipment and dewatering screens for 4½-in. coal to be installed in new plant designed by Solvay Engineering Co. [16] Menzies cone-separator coal-washing equipment. [17] Menzies hydroseparator coal-washing equipment. [18] Rescreening plant, Selectro vibrators. [19] Rescreening plant, American "Anti-Gravity" screens and auxiliary conveying equipment. [20] Two Rheolaveur fine-coal washers to handle slurry and crushed refuse from the secondary refuse elevators of Baum-type jigs. [21] Including washing equipment, 90 tons per hour. [22] Chloride washer. [23] Llewellyn coal-washing equipment. [24] Deister-Overstrom "Diagonal-Deck" coal-washing table; tonnage given in terms of finished product. [25] Rescreening plant, mechanical and Tyler vibrators. [26] Auxiliary screening plant, including Leahy heavy-duty "NO-Blind" vibrator. [27] Washed-coal rescreening and fine washed-coal storage plant.

mechanical-cleaning plants in 1936, and were added in considerable numbers to existing plants. American pulverizer units, for instance, went into the new plant of the Southwestern Illinois Coal Corporation and into existing plants of the Midland Electric Coal Corporation, in Illinois. Aside from reducing refuse size for recovery of coal values, crusher installations were primarily for breaking down large sizes in times of slack demand. But in other cases, specific objectives were set up, as at two mines of the Columbus Mining Co., in Kentucky, equipped with crushers to make such stoker coal as might be requested. In the reduction of extremely large lumps, a number of operators employed Norton pick breakers, including the Pocahontas Corporation, Virginia, lump coal to 8 in., with provisions for subsequent rescreening.

Vibratory Screens Progress

Reflecting the trend toward smaller coal, rescreening plants made substantial progress in 1936, particularly in the South, with vibrating screens as the predominant separating medium. While some installations were designed for only a single size in addition to the residual slack or screenings, others included provisions for several sizes, as well as storage and mixing facilities. In the latter group was the Koppers-Rheolaveur rescreener at the Derby (Va.) mine, Stonega Coke & Coal Co. With a capacity of 200 tons per hour, the plant is designed to separate 1½-in. slack into 1½x¾-, ¾x⅜-, ⅜-in. x 20-mesh and minus 20-mesh sizes, using mechanical vibrators for the ¾-in. separation and two single-surface Tyler 400 screens for the 20-mesh separation. Four bins are provided, with a vibrating degradation screen for delivering the 1½x¾-in. size to a loading boom.

A Fairmont rescreening plant installed at the No. 155 mine, Consolidation Coal Co., Van Lear, Ky., is designed for three sizes. Equipment consists of conveyors, vibrators, loading booms, surge bins and storage bins. Smaller sizes can be dedusted and remixed in varying proportions. Two 4x10-ft. American "Anti-Gravity" screens are employed at the Mead (W. Va.) No. 4 mine, Mead Smokeless Coal Co., for separating ¾x0-in. coal into ¾x¼-in. pea and ¼-in. slack.

Vibrating screens also predominated in dedusting installations, which marked up a major gain in 1936. In many cases, dedusting was coupled with the production of one or more junior sizes, either through the use of tandem screens, as at the Omar No. 4 mine, West Virginia Coal & Coke Corporation (*Coal Age*, December, 1936, p. 562), or in multiple-deck screens, of which the double-deck Nordberg-Symonds horizontal units at the New Monarch mine, Consolidated Coal Co., Herrin, Ill., are examples. Allis-Chalmers vibrators were installed by Panther Creek Mines, Inc., Springfield, Ill., for preparing stoker coal.

Increased use of vibrators for dedusting brought the problem of performance with moist coal more into the foreground. To eliminate variations and inefficiency from this source, the Enos Coal Mining Co., Oakland City, Ind., converted its Tyler electric-screen plant from the dry to the wet basis, using water to wash the dust through the screen surface (*Coal Age*, September, 1936, p. 371). In the same State, the Maumee Collieries Co. installed a rescreening and dedusting plant at its Chieftain No. 20 mine, Keller, including Selectro vibrators with quick-change throw and tilt adjustments for dedusting at 10-mesh. Experience has satisfied the company that the plant will make a commercially satisfactory separation in the absence of extreme conditions. As in a number of other plants, two-stage screening is the practice, with actual dedusting taking place on the secondary screens receiving the small-coal fraction.

Taking Dust from the Home

Installation of dustless-treating equipment reached a new high in 1936, with many operators adopting the Viking hot-oil-vapor process. However, a number of oil-base or chemical treating compounds found favor, such as calcium chloride, three plants of the Koppers group, with oil-treating plants at three others; "Dustlix," No. 17 mine, Maumee Collieries Co., Clay City, Ind.; Koltreat, Nos. 2 and 5 mines, Panther Creek Mines, Inc., Springfield, Ill.; etc. Oil treatment by the hot-vapor process is reported to have reached the status of standard practice for stoker coal in Utah, and the Utah Fuel Co., in addition, treats coal with a catalyzer and is preparing to crush for uniform stoker preparation. Similar oil-treating systems were reported as becoming general in Wyoming, and were widely installed in all fields east of the Mountain States.

The wide increase in the use of oils for coal treating was reflected in 1936 in a research program in which the Standard Oil Development Co., Sun Oil Co. and the Viking Mfg. Co. joined with Bituminous Coal Research, Inc., which is investigating correct quantity to be used, grade and type of oil, permanence of the treatment, and effect on the oxidation, feeding and combustion characteristics of the coal.

In the realm of low-temperature distillation of coal, the work of E. H. Records and James E. Louttitt culminated in the erection of a plant at Tacoma, Wash., by the Coalene Co. It comprises four retorts, each holding 1,000 to 1,200 lb. of coal and working on interlocking cycles, capable of treating 15 to 20 tons of raw coal in 24 hours. The steam, at 4 lb. per square inch, is gasified in a superheater to a temperature of 1,200 deg. F. under conditions favoring high expansion.

With raw coal having 35.95 per cent of volatile matter and 8.47 per cent of moisture, the 1,300 lb. of char per ton of raw coal is said to contain 13.9 per cent of volatile matter and 2.4 per cent of moisture. Each ton of raw coal gives 13 gal. of primary tar oil, 5,000 cu.ft. of 600-B.t.u. per cubic foot gas and 3 gal. of gas oil. Thermal efficiency is said to be 96.5 per cent, and the gas is said to be low in carbon dioxide (7 per cent), oxygen (0.7 per cent) and nitrogen (3.5 per cent).

Manufacture of Disco was continued in 1936 and a new unit may be added in 1937. Radiant Fuel Co. tripled capacity of its ovens in 1936 and now carbonizes 300 tons daily. Progress was made in the completion of a $325,000 low-temperature-carbonization program of the Lehigh Briquetting Co., Dickenson, N. D. This included, however, not only a new carbonizer, installation of a spur track and new distillation equipment, but also electrification of the mine, installation of a new hoist, repair of old and installation of new bypasses, cutoffs and shaft for better mine ventilation, and large-capacity pumps.

Briquets from Lignite Char

Upon completion of this construction the company expects to produce 60,000 to 70,000 briquets annually, triple its present production, carbonizing all the lignite from the mine and extracting oils, gases and char. The lignite is reduced in char before briquetting. About 15,000 tons of lignite pitch will be produced as well as some 600,000 gal. of high-grade creosote. Following University of North Dakota tests, several ovens probably will be erected in the spring to produce activated carbon from the char.

SAFETY RECORDS

+ Forecast New Low in Fatality Rates

By D. HARRINGTON*
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THE YEAR 1936 joins 1933, 1934 and 1935 (and one might also include 1931 and 1932) in producing encouraging evidence that accident occurrence in the coal mines of the United States can be reduced materially as compared with any year previous to 1931. In 1933, when total coal-mine fatalities fell to 1,064, or 2.78 deaths per million tons of coal produced, an all-time low both as to number of coal-mine fatalities in the United States and as to their rate of occurrence was set. The first eleven months of last year had a definitely lower fatality rate than the first eleven months of 1933, and, since there were no major disasters in December, 1936, one might be justified in the prediction (certainly one cannot be blamed for entertaining the hope) that 1936 will have to its credit a slightly, yet definitely, lower rate of occurrence of fatalities than in any previous year of our history.

New Monthly Low Made

Anthracite established an all-time low fatality rate per million tons produced for a single month when only six fatalities occurred in October, 1936, in the production of 4,253,000 tons of coal, giving a fatality rate of 1.41.

Since total production—and, therefore, exposure—was considerably higher last year than in 1933, it is likely that, even if the fatality rate should be lower, the number of fatalities will approximate 1,275 instead of the 1,064 of 1933. It probably will be several years before total fatalities again hover around 1,000, though with the right amount of concerted, well-directed effort there is good reason to believe that the number could readily be brought below 500. Non-fatalities can be reduced even more drastically, as accident-prevention experience in mining as well as in other industrial work indicates that accident frequency is much more readily reduced than accident severity.

The progress in accident reduction shown in Table I indicates that both bituminous and anthracite mining have broken the all-time low fatality rate set in 1933. Mr. Adams' tentative figures are likely to be fairly close to final figures; if this assumption holds, the rate of occurrence of fatal accidents for the year will be 2.65 fatalities per million tons of coal produced, or materially lower than the record of 2.78 established in 1933. As the tabulation shows, since 1933 the fatality rate has remained consistently below 3.00 per million tons; this in itself is highly significant, since these years (1933 to 1936) are the only ones in the recorded coal-mining history of the country when the fatality rate was held below 3.00 persons killed per million tons of coal produced. The past four years, therefore, may be said to have established a new era in safety in the coal mines of the United States, though it must be admitted that many years of tedious and at times disheartening educational work was necessary to lay the foundation for this encouraging record.

Table I—Coal-mine fatality rate (United States) 1930-36 inclusive.

Year	Fatality rate per million tons: Bituminous	Anthracite	Combined	Total Fatalities	Total Tons
1930	3.46	6.40	3.84	2,063	536,911,136
1931	2.83	6.42	3.31	1,463	441,750,978
1932	3.09	4.99	3.36	1,207	359,565,093
1933	2.50	4.66	2.78	1,064	383,171,877
1934	2.65	4.69	2.93	1,222	416,536,313
1935	2.62*	5.27*	2.95*	1,238*	419,660,000*
1936	2.41†	4.64†	2.65†	1,275†	481,926,000†

* These figures are from Bureau of Mines records and, while tentative, are essentially correct and are likely to vary but little from the final figures.

† Tentative as estimated Jan. 4, 1937, by W. W. Adams, Employment Statistics Section, U. S. Bureau of Mines. These figures are likely to vary but slightly from the final figures, which will not be available for several months.

One of the main factors contributing to the improved safety record of our coal mines during the past few years is the absence of major fire and explosion disasters, and, while the performance of 1936 in this particular is not as good as that of any of the preceding three years, it was by no means bad. Five major disasters occurred in 1936, with a total of 37 fatalities, compared with four in 1935 with 35 fatalities, two in 1934 with 22 fatalities, and one in 1933 with seven fatalities. The occurrence of five major coal-mine disasters with resultant 37 fatalities in one year is nothing of which to be excessively proud, yet, with the exceptions of 1921, 1933, 1934 and 1935, this is a much better record than the coal mines of the United States can show and certainly is a much more satisfactory record than that of 1907, with 18 major disasters resulting in 918 deaths, or 1908 with 11 disasters and 348 deaths, or 1909 with 19 disasters and 498 deaths, or 1910 with 19 disasters and 485 deaths, production for these years being little if any greater than that of 1935 or 1936.

During the four years 1933–36 inclusive, there were twelve major

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coal-mine disasters with 101 fatalities in the United States, or an average of three disasters and 25 fatalities per year; in the four years 1907–10 inclusive (or the years preceding the establishment of the United States Bureau of Mines) there were 67 disasters with 2,249 deaths, or an average of about 17 disasters and 562 fatalities per year. Comparing the figures for the two periods, a reduction of about 82 per cent in the number of disasters annually is shown during the past four years as against the four-year period 1907–10 inclusive and a reduction of more than 95 per cent in the number of fatalities from disasters, a rather startling indication of the increased safety of our coal mines, at least in so far as disasters are concerned.

Disasters and Causes

After about nine years of freedom from major coal-mine disasters, Colorado was unfortunate in having one in a lignitic mine; it is strongly suspected that lignitic coal-dust participated materially in the extension of the explosion, probably the first fairly well authenticated instance of entrance of lignitic coal-dust into a mine explosion. Illinois had a mine fire with nine fatalities from breathing poisonous gases, the first major coal-mine disaster in that State since December, 1932. This is the third year in succession that a major coal-mine fire disaster has occurred in the United States. Does this mean that our coal-mining people have forgotten how to handle mine fires with reasonable protection of those engaged in the work?

After about four years' freedom from major disasters, Arkansas had one in which five persons were killed. West Virginia had its first major explosion disaster since November, 1931, though this State had a coal-mine shaft fire in May, 1935, with six deaths. Pennsylvania's bituminous mines operated throughout the year without a major disaster and now have the very meritorious record of experiencing but one major explosion or fire disaster in more than six years and that one resulted in but seven deaths. Several relatively heavy coal-producing States, such as Alabama, Indiana, Ohio, Oklahoma, Washington, Utah, and Wyoming, now have had six or more years of immunity from major disasters. Wyoming has a particularly good record, as the coal mines of that State have been free of major disasters for more than twelve years.

During the past year there were several ignitions of gas or dust or both stopped by rock dust after taking a few lives in some instances and resulting in more or less trivial scorching or burns in others. It is conservatively estimated that in 1936 rock-dusting aided materially in stopping explosions which might have cost 300 or more lives had it not been for the rock dust.

One of the disquieting features of the year's occurrences, however, is that all of the five major explosion disasters with their 37 fatalities were suspected of having been initiated by electricity. In addition, there were several other explosions with resultant fatalities, fewer than five each or in some cases without fatal accident, though with more or less severe scorching of one or more persons, in which electricity was either known or suspected as being responsible for the initiation. This indicates very definitely that electricity continues to be used without sufficient attention to its inherent hazards and far too much reliance is placed upon protective measures rather than on installing and using electrical equipment only in places where it can be used safely, providing safe types of electrical equipment and keeping it in repair, and outlining and keeping in effect safe methods of use of electrical equipment. In fact, it appears that in many instances far too much dependence is placed on "Lady Luck" rather than on the application of common-sense procedure in connection with the application of electricity to coal mines and coal mining.

Injury Rates Mostly Down

The tentative data available for the eleven months of 1936 to Dec. 1 indicate that in all of the main causes of accident occurrence in coal mines (except explosions) the accident rate is lower than for the similar period of 1935, and this is gratifying because up to 1936 there were only two years in our coal-mining history with lower coal-mine accident rates than 1935 (1933 and 1934); and it is a source of satisfaction that safety performance is progressing, even though slowly, in practically all phases of accident causation rather than having progress confined to but one or two of the numerous causes of accident occurrence. It is particularly fine to learn that the fatality rates from falls of roof and coal and from haulage both show a slight, but definite, downward trend from those of 1935; these two accident causes (by far the most important two in coal mining) have remained consistently high and are by all means the most difficult to control and reduce.

That much good work is being accomplished is evident not only from the fact that the past few years have shown a definite downward trend in accident occurrence in coal mining but also individual coal-mining companies are establishing records of safety in operation little short of phenomenal. One underground coal mine worked considerably over 500,000 man-hours and produced around 400,000 tons of coal without a lost-time accident; numerous other underground coal mines in several States, working under different conditions, have operated one, two, three or more years without a lost-time accident and produced usually in excess of 100,000 tons and up to or over 300,000 tons; scores of underground coal mines have produced 2,000,000 or more tons of coal and up to or over 6,000,000 without a fatality and one surface (open-cut) mine handled upward of 91,000,000 tons of material (about 5,400,000 tons of coal and 86,000,000 tons of rock) without a fatality.

Why Mines are Safer

What is the reason for the admittedly increased safety performance of our coal mines in the past few years? The answer is by no means simple and certainly it is not to be found in any one particular alteration of operating practice or condition. Avoidance of explosion, fire, and other multiple disasters probably has been the outstanding aid in the sharp decrease in coal-mine-accident rates since 1931 or 1932; this, too, is due to a multiplicity of causes, including recognition of the fact that these disasters are costly and yet are preventable and that if reasonable attention is given to ventilation, reduction of coal-dust production, or its neutralization by rock-dusting, or both, and if mechanical installations are made with reasonable care and kept in repair, and their operation in mines held under competent supervision, these multiple accidents can be readily prevented.

The prevention of disasters, with their multiple fatalities, is largely in the hands of the operating company and therefore is relatively easy to control; the prevention of the so-called sniping accidents, affecting usually one person at a time, such as in falls of roof and coal, haulage, contact with electricity, blasting, etc., depends largely on the acts of

commission or of omission by individuals. Therefore, control or limitation has been and still remains the really difficult problem in making progress in accident reduction in coal mines, as there are nearly half a million individuals whose personal conduct may have a vital influence on the occurrence of these sniping accidents. The law places on the operator the responsibility for these as well as all other accidents in and around mines, as the various States require the industrial organization (the mining company in this case) to compensate the accident victim. This responsibility is a most difficult one for the mine operator, as the fulfillment of the implied obligation to reduce accident occurrence requires a combination of several procedures including intensive supervision, strict yet diplomatic discipline, fundamental or even primary safety education of the workers, and numerous others, including the absolute necessity of obtaining and maintaining the cooperation of the worker. First and foremost, the employer must put his own house in order by doing everything in his power to provide a safe (and healthful) place to work, with the heavy expenditure of time, effort and funds which this entails.

In general, mines with long-time operation without lost-time accidents are hand-loading properties and those with heavy tonnages without a fatality are mechanized mines; however, in a few instances highly mechanized mines have operated a year or more without a lost-time accident and, on the other hand, scores of hand-loading mines have produced heavy tonnages without a fatality.

Although the major responsibility for prevention of accidents rests on the employer, he requires and receives aid of various kinds and from various agencies; otherwise his efforts would be barren of result. First of all, he must obtain the confidence and cooperation of the workers; in fact, that's more than half of the battle. The employer who is awake to his opportunities also enlists the aid of State and federal as well as local agencies; in some instances, these local agencies are readily available and can be used to decided advantage. In any event, safety of operation can be secured and maintained only by constant, persistent effort, with occasional variation of the method of approach; and if success is to be had there can be no "let-up," because safety has been aptly termed a journey rather than a destination. Unquestionably, progress is being made in safety in the coal-mining industry, hence the coal industry may be said to profit by its safety journey and it is to be hoped that the journey will be even more successful in 1937 than it was in 1936.

BITUMINOUS STRIPPING

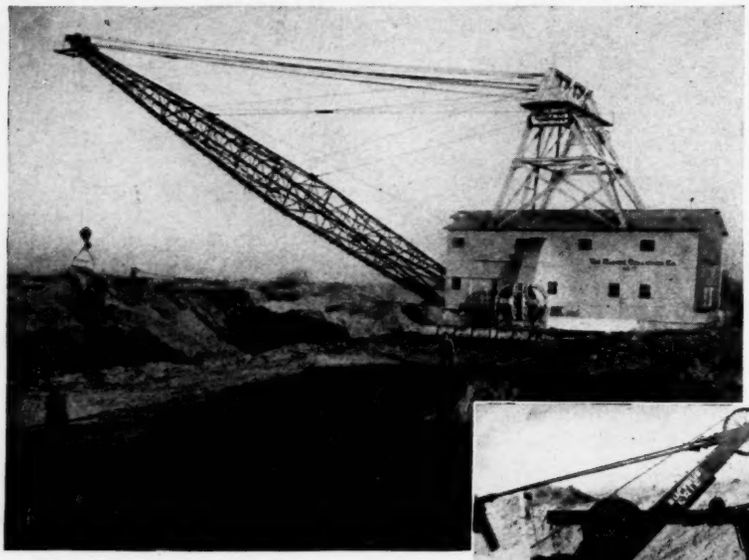
+ Adopts New Methods in Active Year

A SUBSTANTIAL increase in capacity growing out of a number of new operations featured bituminous stripping developments in 1936. Installation of stripping and loading equipment consequently was marked, from the size standpoint, by considerable activity in the two major classes of such units: (1) strippers with dippers of 30 and 32 cu.yd. and loaders of 5 to 7 cu.yd., and (2) shovel and dragline equipment for either or both stripping and loading with dippers or buckets of less than 5 cu.yd., usually powered by internal-combustion engines. Production of coal by operators specializing in the latter type of equipment, primarily for recovering small or isolated tracts, registered a substantial increase in 1936.

Stripping progress also was marked last year by the installation of the first all-electric walking dragline with 12-cu.yd. bucket at an Indiana pit. Automotive transportation of coal from pit to dumping point made still another advance, and was adopted for all the new operations opened during the year. Both straight-truck and trailer units figured in the various installations. Auger-type coal drills were used in increasing numbers. Two stripping organizations employed vertical-type auger drills for overburden, and experiments with this type of equipment were carried out by several others.

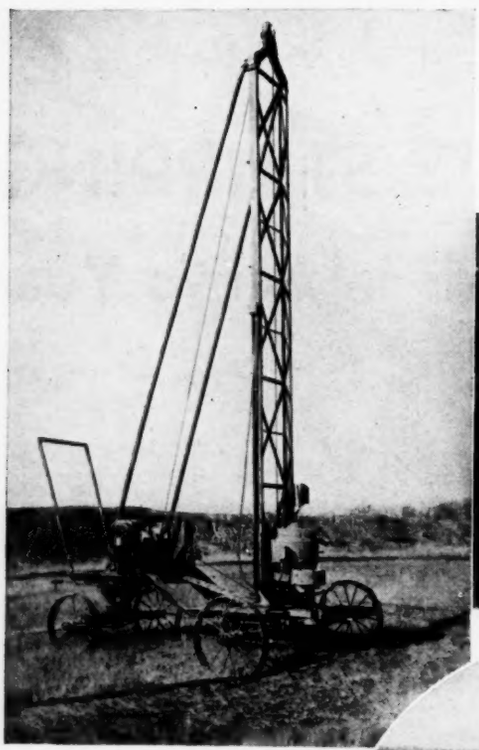
Overburden-to-coal ratios of up to 11 to 1 featured the new major stripping projects opened in 1936. At the Bevier (Mo.) operation of the Binkley Mining Co. of Missouri, average thickness of the Bevier seam is 4 ft. and average thickness of the overburden is 45 ft. The stripping unit is a Bucyrus-Erie 950-B electric shovel with 30-cu.yd. dipper, while the loading shovel is an 85-B unit with 5-cu.yd. dipper. At the Victoria (Ill.) stripping of the Little John Coal Co., employing a 950-B shovel with 32-cu.yd. dipper and an 85-B loader, average coal thickness is 4 ft., compared with average overburden thickness of 36½ ft.

Coal thickness at the new St. David (Ill.) mine of the Central State Collieries, Inc., averages 5 ft. and overburden 35 ft. Stripping is done by a 16-cu.yd. 550-B shovel and loading with a 5-cu.yd. 85-B shovel. The Percy (Ill.) operation of the Southwestern Illinois Coal Corporation, on the other hand, recovers 6 ft. of coal under 30 to 35 ft. of cover, using a Marion 5560 stripper with 26-cu.yd. dipper and a Marion 4121 loader with 7-cu.yd. aluminum-alloy dipper. The overburden is broken up with L.O.X. At the new operation of the Sahara Coal Co., near Carrier Mills, Ill., stripping is done with a 950-B shovel with 32-cu.yd. dipper and the coal is loaded with a 100-B shovel with 5-cu.yd. dipper. With a few exceptions, "Man-Ten" or other

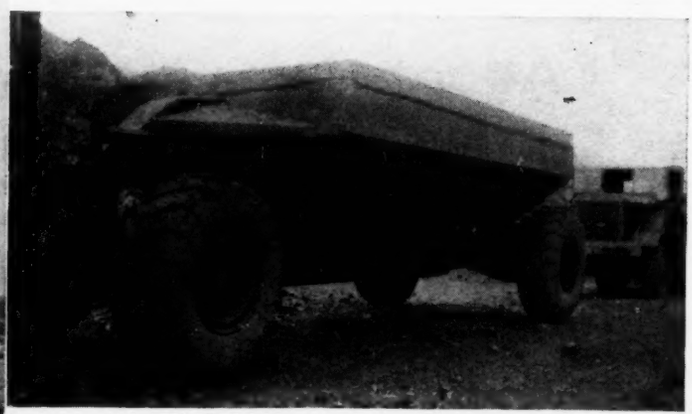


Walking dragline with 12-cu.yd. bucket finishing up a pit at No. 17 mine, Maumee Collieries Co., Clay City, Ind. In the next pit, the unit will move down onto the top of a shale bench.

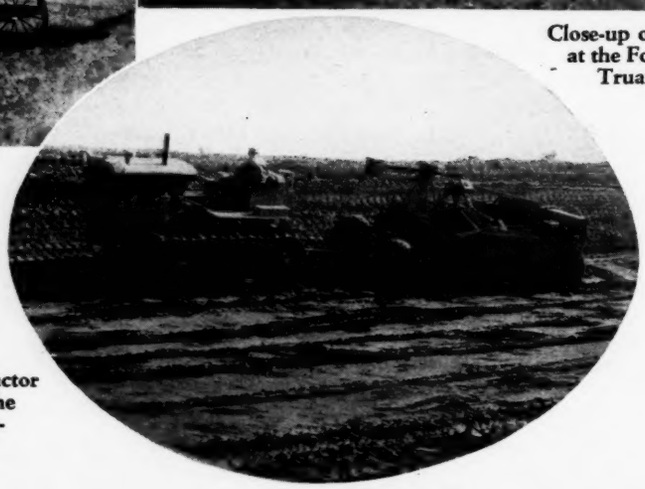
Tandem trailers at the loading shovel in the new Sahara Coal Co. stripping, Illinois.



Vertical auger drill used by the Delta Coal Mining Co., a Sinclair property, near Carrier Mills, Ill.



Close-up of trailer installed at the Forsyth No. 2 mine, Truax-Traer Coal Co.



Scraper unit pulled by tractor removing overburden at the Fiatt (Ill.) mine, Truax-Traer Coal Co.

welded manganese alloys characterized dipper construction.

Revisions in existing equipment to increase capacity were fairly frequent in 1936. The Pyramid Coal Corporation, for example, installed a 30-cu.yd. 950-B stripper and a 5-cu.yd. 85-B loader at its No. 1 operation, Pickneyville, Ill. The 750-B stripper with 18-cu.yd. dipper (increased from 12 cu.yd. previously used) was moved over to the No. 3 pit, together with the 75-B loader. In this move, the 3½-cu.yd. cast dipper on the loader was replaced with a 5-cu.yd. welded unit, and a steam loader in No. 1 pit and steam stripping and loading equipment in No. 3 were taken out of service. Included in the list of operations which replaced dippers was the Fidelity No. 11 mine of the United Electric Coal Cos., Duquoin, Ill., which installed 15-cu.yd. "Amsco" units of the same weight on two shovels in place of the 12-cu.yd. dippers previously used.

12-Yd. Dragline Started

As the first step in an extensive improvement program, the Maumee Collieries Co. installed an all-electric Bucyrus-Monighan walking dragline with a 165-ft. boom and 12-cu.yd. bucket at its Maumee No. 17 (Old Glory Brazil Block) mine, near Clay City, Ind. This unit replaced steam stripping equipment, which was inadequate to give the desired production in the heavier overburden into which the operation was advancing. The dragline now is finishing up the present pit, and when it is completed the unit will go into a new pit, where it will work on top of the shale bench. Electric loading equipment and automotive haulage will be employed. The dragline is supplied with power through a ground-cable system, the first application to such equipment.

Western Kentucky also was the scene of a new stripping development in 1936, that of Leslie Larsen & Co. Ohio activity increased, while Iowa furnished an example of operation with small dragline and shovel equipment, an increasingly important factor in bituminous stripping in late years. The Iowa operation in question is that of the Atlas Coal Co., Inc., near Oskaloosa. Stripping is done with a Bucyrus - Monighan diesel - electric walking dragline with a 110-ft. boom and 4-cu.yd. bucket. Overburden thickness, it is reported, averages 28 ft., with some running up to 55 ft. Two loading shovels are in use, one with a 1½- and the other with a 1-cu.yd. dipper.

Trailers continued to hold their place as the principal type of automotive transportation equipment at the larger strippings, with straight trucks, predominantly end-dump, in the majority at the mines using small-capacity-dipper or bucket equipment for stripping and loading. One exception in the larger-equipment group was the Southwestern Illinois Coal Corporation, which installed Mack trucks with 15-ton bodies with side-opening doors similar to those developed at the Boonville (Ind.) operation of the Sunlight Coal Co. (*Coal Age,* May, 1936, p. 189). Garwood side-dumping bodies were adopted by the Blue Bird Coal Co., Carrier Mills, Ill. These units dump sidewise into railroad cars from a timber ramp. Length of the ramp is such that three cars can be spotted for loading at once. To prevent spillage between cars, a V-shaped bridge member arranged so that it can be raised and lowered is used to cover the gap between one car and the next. Cars when filled are dropped down into a loaded hole, where they wait until a locomotive comes to pull them to the preparation plant.

Tandem Trailers Used

At the new Sahara stripping, the 25-ton Austin-Western trail cars were designed to be used in tandem behind a single Auto-Car tractor. Later, when the grade between pit and tipple changes, the tandems will be changed into single trail cars. Single units, such as the 23-ton Austin-Western trail cars pulled by White tractors at the Central State Collieries mine, were adopted by most operations, however, including the Truax-Traer Coal Co., which installed seven Euclid tractor-trailer units at its Forsyth No. 2 stripping, Elkville, Ill., in June, 1936. Three similar units, but with a slightly smaller capacity, were previously put in service at the company's Fiatt (Ill.) mine. Capacity of the Forsyth units is 20 tons. Trailers are of the latch-operated bottom-dumping type, and the rear end of the trailer, which is unsprung, is carried on 18.00x24 tires. Rear tires on the tractor also are single and correspond in size to the trailer tires, while front tires on the tractor are 10.50x24. Trailer weight distribution is approximately 45 per cent front and 55 per cent rear. In constructing the trailers, a special alloy of the Youngstown Sheet & Tube Co.—"Yoloy"—was employed, reducing weight of the hopper from 4,600 to 3,500 lb.

Vertical auger-type overburden drills were used by the Blue Bird Coal Co. and the various operations of the Sinclair interests in southern Illinois and the Southwest in 1936, following their development by these two organizations a year or two before. These drills consist essentially of a derrick on which a back-geared or gear-motor moves up and down in guides. A chuck on the motor or gear-motor shaft accommodates the auger, which is passed through a guide, or collar, at the bottom of the derrick. A small hoist is used to raise the motor and augers. Molefoot bits are used in cutting through the overburden. Augers are made in suitable lengths, and as many lengths are used as are necessary to drill to the desired depth. A 2-in. pitch for the spirals is most commonly used. Faster drilling in softer overburden is one of the advantages cited for this type of equipment, and has led in a few cases, where a hard rock appears over the coal, to the experimental use of the auger drill to go down to the rock, reserving the conventional well drill for the final step.

At the Fidelity No. 11 strip mine, overburden hole size was increased from 6 to 10 in. in 1936, with a consequent reduction of 50 per cent in the number of holes required. Overburden at this mine is shot with L.O.X. The increase in hole size at Fidelity was made possible by the thick rock encountered, which averages about 16 ft., with little under 10 ft.

Scrapers Stage Comeback

Scrapers staged a reappearance in bituminous stripping in 1936—primarily as an aid to opening box cuts but in at least one instance as the primary stripping medium. The Truax-Traer Coal Co. adopted 8-cu.yd. Le Tourneau "Carryall" scrapers powered by caterpillar tractors for the preliminary earth removal in opening new pits at its Elkville, Fiatt and St. David (Ill.) operations and at its strip mines in other fields. An advantage cited for this equipment is ability to haul the spoil as far away from the site of operations as desired. At the St. David pit, it is reported, an 8-cu.yd. unit, over a 128-hour period, averaged 90.3 cu.yd. of top soil and heavy clay per hour, hauling the material an average of 300 ft. to the dumping point. Other installations in 1936 include: Midland Electric Coal Corporation, Farmington, Ill., 8 cu.yd., and the Moffat Coal Co., southern Illinois, and the C. A. Wagner Construction Co., Firesteel, N. D., 12 cu.yd.

POWER EQUIPMENT

+ Keeps Step With Mechanization Progress

CHANGES in direct-current substation practice and revamping of distribution systems to bring power standards to a par with the higher efficiencies of men and machines stand out as the twin buttes on the 1937 plateau of electrical and mechanical progress. In the realm of maintenance, wider adoption of improved materials and designs, further progress toward all-the-way methods and the provision of better facilities for inspection and care of machinery evidenced the new thinking of management resulting from increased use of power equipment. On the horizon appeared the possibility of utilizing d.c. trolley wires for mine telephones, thus enabling the motorman to communicate with the dispatcher from his seat on the locomotive.

Installation of the first coal-company-owned mercury-arc rectifiers for operating underground coal-mining machinery was a milestone of the year. A Westinghouse unit with a continuous rating of 600 kw. at 575 volts d.c. was installed by the Pittsburgh Coal Co. at its Crescent No. 2 mine, near Belle Vernon, Pa. The location is a surface substation at a pit mouth 3.7 miles from the tipple and near the working area of the mine. This rectifier is of the six-phase tank type without grid control, and the short-time ratings are 900 kw. for two hours and 1,200 kw. for five minutes.

Control is full-automatic. Panels and rectifier tank are housed in a small tile building, but the air-to-water intercooler, power transformers (2,300-volt primary), oil switch and control transformers are located in the open. Thus no high-voltage a.c. equipment has been placed in the building. Prestone is the anti-freeze and anti-corrosion agent used in the cooling system.

To simplify insulation and provide safer operation the tank (which is the cathode or negative of the arc but is the positive of the mine load) is connected to the rail and the other terminal to the trolley wire. Thus the current flows from rail to trolley wire instead of in the opposite direction, which hitherto has been the accepted practice because with it electrolysis gives less difficulty. Feeders from the substation consist of four 1,000,000-circ.mil parkway cables buried in the mine floor. Locomotives, cutters, mobile loaders and pumps are included in the normal mine load on the rectifier.

Work on the installation of an Allis-Chalmers 600-kw. 575-volt rectifier by the same coal company at Montour No. 4 mine, Hills, Pa., was nearing completion in the closing days of 1936. In this installation the intercooler has been placed inside the building. From this substation the feeders enter the mine through a borehole. Installation of a 300-kw. 275-volt Westinghouse tube-type ignition rectifier also was in process at a mine of the Union Collieries Co. in western Pennsylvania at the end of 1936. This unit, to supply direct current for general mine use, is being installed about two miles from the shaft opening.

Prior to these installations, the only other rectifier regularly in service supplying power to a coal mine was a 300-kw. 550-volt Brown-Boveri tank-type unit operated by the Appalachian Power Co. to supply direct current to the Rolfe mine of the Pocahontas Fuel Co., Worth, W. Va. It has been in service since 1927 and records show that its substitution for the motor-generator formerly used raised the station efficiency from 50 to 85 per cent and reduced the annual maintenance cost $116.60 per year. In 1930, the Glen Alden Coal Co. operated a 275-volt rectifier experimentally for a few months at an anthracite mine. Because of the greater efficiency of the

Skids on the back of the protective box, auxiliary knife switches and standardized connection boxes cut breaker-moving time to five man-hours

higher-voltage machines they were the first to come into regular use.

In the rotating-type substation, advances were made in ventilation for cooling and in the inclosures for safety and mechanical protection. Instead of relying on the regular mine ventilation to carry away the heat from its motor generators, the West Virginia Coal & Coke Corporation, at its two most recent underground full-automatic substations, adopted blowers and ducts to force air up from the foundation pits. At the intake, which with the blower is placed outside the substation room, filters remove dust from the cooling air, thus keeping a clean substation (*Coal Age,* December, 1936, p. 593).

Oil switch, auto-transformer and a.c. contactors of the automatic starting units of these substations are inclosed in steel cabinets. A further step toward complete inclosure of automatic switching and control apparatus was evident in the new underground substations of the Boone County Coal Corporation, Sharples, W. Va. In these automatic boards, a totally inclosed automatic compensator developed for steel-mill service is combined with a steel cabinet to form a cubicle containing all the a.c. control apparatus.

Substations on the Move

More portable substations were introduced during the year. To reduce the cost of the frequent relocations inevitable with high-speed mechanical mining, the Chicago, Wilmington & Franklin Coal Co., in the Orient mines, West Frankfort, Ill., devised and put into use portable substations with self-supported covers (*Coal Age,* August, 1936, p. 321). The truck-mounted motor-generator is contained in a steel barrel with a fan at one end to circulate cooling air. Inspection holes with hinged covers are provided opposite bearings and commutator. The semi-automatic control equipment, mounted on a second truck, is protected by a canopy of steel from water drips and roof falls. As special rooms need not be constructed for these substations, they can be moved more often and thus the advantages inherent in portables will be more completely utilized.

Conversion of present equipment to portable units also was undertaken at several operations last year. As an example, one motor-generator set was made portable at the New Monarch mine of Consolidated Coal Co. Herrin, Ill., and the remainder are scheduled for such conversion. Switchboard and m.g. set are mounted on a truck, and the unit is started across the line with an oil switch.

Another advance in power-equipment for mechanical mining is the portable skid-mounted automatic reclosing circuit breaker with interchangeable standard-length connection cables put into use by the Wheeling Township Coal Mining Co., Adena, Ohio (*Coal Age,* June, 1936, p. 254). One circuit breaker is used for each panel and serves two loading-machine units. The circuit breaker is installed in a crosscut between panel headings, and the standardized cable connections allow installation close to either the right-hand or left-hand heading.

Further developments of the year in substation equipment indicated a trend away from the over-compounded d.c. generator. Larger locomotives and a tendency toward the smaller substations placed closer to the mine-section load centers brought about the change. In some cases the substation was given a drooping characteristic to prevent it from being overloaded by heavy locomotives passing near by. The disadvantage of a flat or drooping characteristic from the standpoint of voltage loss in feeders is less pertinent now that the substations are closer to the loads and more efficient feeder lines are being used. The Pittsburgh Coal Co. rectifier installation without grid control is indicative that voltage compounding is not thought to be as necessary as it was years ago.

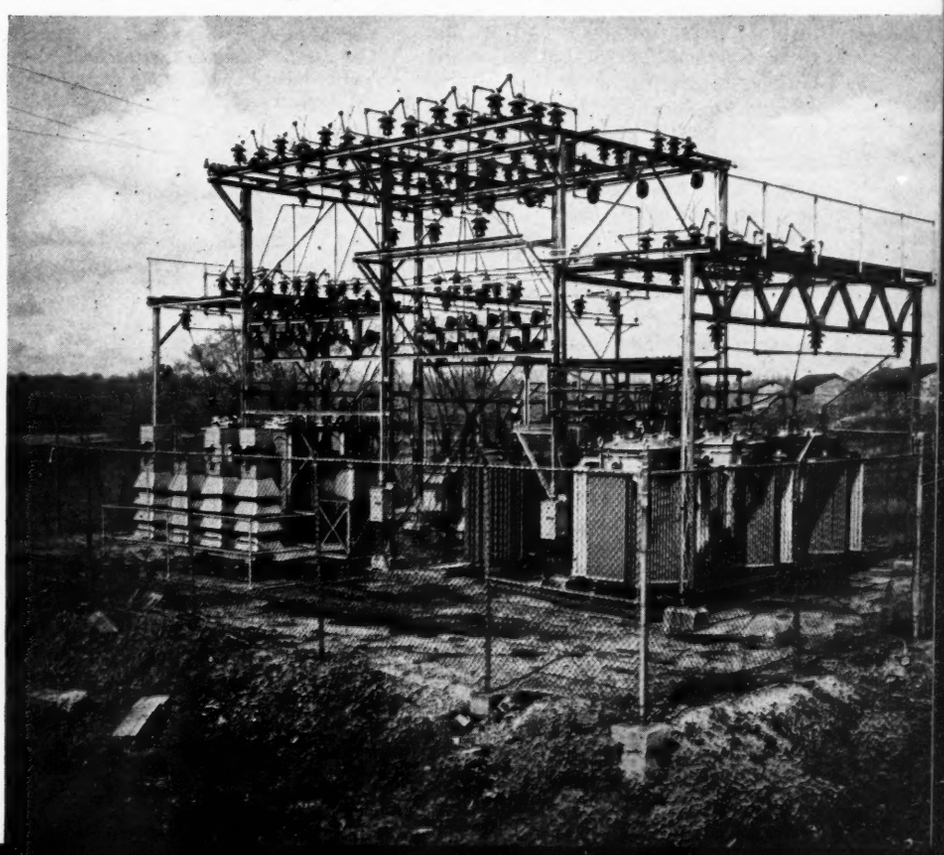
At many mines, power-distribution systems were revamped during the past year to conform to the demands of greater distances and the increased consumption per ton of coal mined. Substation synchronous motors at the Orient mines were changed from 2,300 volts to 4,000 volts, thus practically halving the voltage drop in underground distribution cables. At some mines also metering points were moved nearer the mine load center.

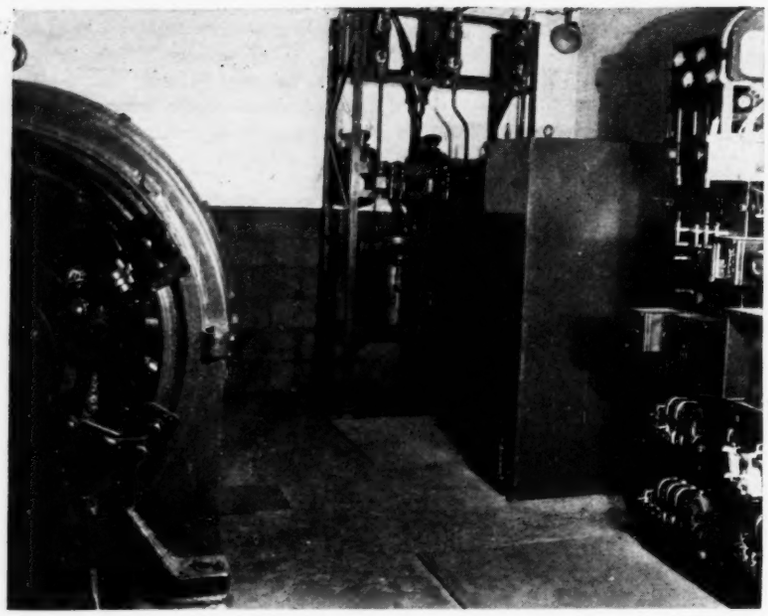
In installation of underground a.c. conductors, a further trend from metallic to non-metallic covered cables may be noted. The attack on the old problem of trolley-wire guarding did not let up during the year. At the Orient mines, long strips of ½-in. hard-pressed board were installed to replace the split-hose boards so widely used in mines. At the Talleydale mechanical mine of the Snow Hill Coal Corporation, near Terre Haute, Ind., angle-shaped, molded rubber guards were installed.

Only a few years ago 350,000-circ.mil (about No. 6/0) trolley wire came into use; now several mines in southern West Virginia are reported to be using 416,000-circ.mil trolley wires (roughly equivalent to No. 7/0 wire). Rail-bonding practices showed no material changes, but welded rails appear to have gained favor.

At two mines in Logan County, West Virginia, tests were made of a telephone which uses the d.c. distribution system as connecting line. It operates by high-frequency currents such as are used in radio and has the attractive possibilities of eliminating telephone-wire maintenance and permitting telephones to be installed on trolley locomotives, thus

Transformer substation capacity was raised to 6,500 kva. at New Orient





In this full-automatic underground substation of the West Virginia Coal & Coke Corporation the cubicle in the center contains the high-voltage a.c. switching equipment

putting motorman in direct communication with dispatcher.

Developments in the construction of power-generating facilities were marked both by additions to or revisions in existing plants and construction of entire new plants. In addition to plants actually constructed, plans for others were pushed back by large expenditures for mechanization of loading or were shelved in certain cases as a result of rate reductions in some districts. Mechanization also was responsible for most of the power-plant additions, such as at the New Monarch mine, where an extra boiler and a stand-by turbine were installed, and at the Rock Springs (Wyo.) plant of the Union Pacific Coal Co., which increased generating capacity from 8,500 to 13,500 kw. and added two pulverized-fuel-fired boilers, each with a capacity of 75,000 lb. of steam per hour (*Coal Age*, June, 1936, p. 266. The new boilers were designed for a pressure of 450-lb. gage and a total temperature of 750 deg. One operating at that temperature and pressure supplies the new 5,000-kw. generator and the other, at 150 lb. and 100 deg. superheat, is employed in connection with the operation of generation equipment previously installed. In Illinois, the new stripping operation of the Central State Collieries, Inc., was equipped with a 2,750-kw. power plant designed to use washery slurry on Coxe stokers. A power plant also was included in the facilities at the new 1,000-ton-per-day stripping of the Atlas Coal Co. in Iowa.

During the year, the Clearfield Bituminous Coal Corporation, Indiana, Pa., added a turbo-generator and an additional boiler, the latter equipped with a spreader-type stoker by means of which the company is able to produce its steam requirements with fuel reclaimed from unmarketable picking-table refuse and road cleanings.

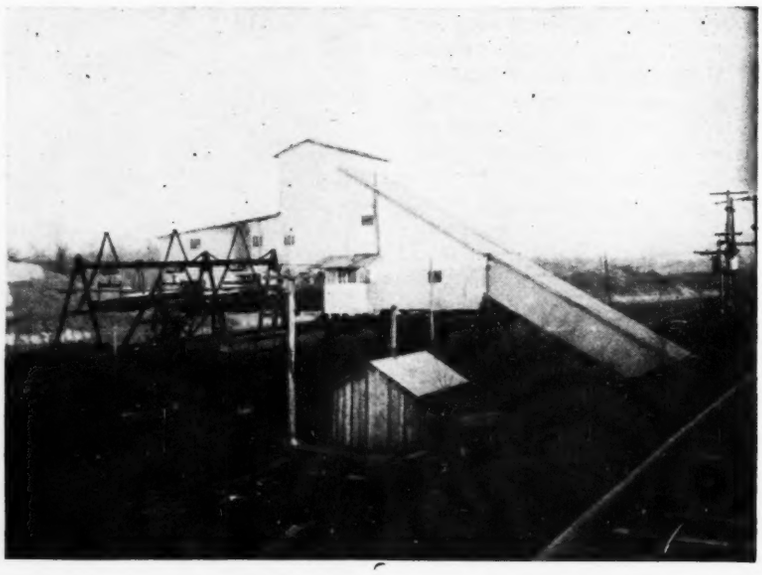
Changes in mining-machine-bit practice engaged the attention of maintenance men. Bit tipping with hard-surfacing materials approached standard practice in certain fields and some companies went all the way by hardening and drawing the bits after completing the surfacing. Specific developments in bit treatment are discussed in more detail in the article beginning on p. 62.

Widespread adoption of the electric mine-car gun featured the lubrication field. Installation of centralized lubrication systems in tipples and breakers continued the gains of previous years.

Mine-locomotive-wheel practices showed little change during the year. Filling tires by arc welding and the use of filler strips gained only slightly. To speed filling by manual welding, one company, by adopting a water-cooled holder, was able to increase the electrode size from ¼ in. to 3/8 in. It appears that rolled-steel wheels also registered a slight gain, but their use is still limited principally to the larger companies. As a step toward lower mine-car maintenance cost and lighter-weight cars, several companies went further into the use of cast- and wrought-steel mine-car wheels.

Welding and cutting continued to make progress in the mine maintenance and construction fields. As an example of the extent to which welding can be utilized, a new tipple built at the No. 17 mine of the Maumee Collieries Co., Clay City, Ind., in 1936, was welded throughout, including not only the frame but also the equipment, such as screens, conveyors, booms, etc. In 1935, as a result of steady increases in gas consumption, the Consolidated Coal Co. adopted a policy of piping oxygen and acetylene from a central point to conveniently located hose outlets at its New Monarch mine, as against

Welding was employed in the erection of this tipple at the No. 17 mine of the Maumee Collieries Co., Clay City, Ind., and in the fabrication of the equipment. The tipple, a five-track plant with three loading booms and a capacity of 300 tons per hour, was built in 30 days (June 26-July 25).



the former practice of using tank sets. One result was a 50 per cent reduction in acetylene consumption, in addition to time savings, and this year a similar system was installed at the company's Mt. Olive (Ill.) operation.

An item of underground portable equipment which underwent a marked change was the air compressor. Only a few years ago the air-cooled type was a new development for underground work. Now several manufacturers offer that type and during the past year it displaced the old water-cooled units at numerous mines. Less weight, smaller dimensions, lower first cost, less operating care required and lower maintenance cost are among the advantages. Activity in the installation of deep-well turbine pumps continued in 1936, as detailed in the article beginning on p. 62.

Changes in illumination practice included wider use of electric cap lamps and an improvement in picking-table lighting. To improve man and machine efficiencies, many mines regarded as non-gaseous switched to electric cap lamps. Developments in picking-table lighting were marked by a number of installations of high-intensity mercury-vapor lamps affording 50 to 200 foot-candles of illumination, against the not uncommon levels of 1 to 10 foot-candles five years ago. One table at the Clymer No. 1 mine of the Clearfield Bituminous Coal Corporation, Clymer, Pa., for example, was equipped with two 400-watt General Electric units. The lamps were mounted about 38 in. above the level of the table, and the nature of the illumination gives the refuse a distinctive appearance, facilitating its removal. The range of illumination is such that two pickers (one on each side of the table) can work to advantage with each lamp. On the basis of experience with the initial installation, plans were made to install similar units over other tables.

Gear-motors came into common use for the low-power low-speed individual motor drives in tipples and cleaning plants, but the V-belt lost no ground in its applications to single reductions within its practical limit of ratio. As a possibility for a variable-speed fan drive certain observers have eyed the installation of a 400 hp. General Electric Thyratron controller by the Appalachian Power Co. at Logan, W. Va. The duty is driving an induced-draft fan in a power plant. Although the motor is practically of standard synchronous design, its speed can be varied within wide limits without rheostatic losses.

Extensions of the use of electric power came into evidence in 1936. A number of new mines using mobile loaders and complete conveyor haulage to the tipple went into production. At certain mines the electrical load was increased by adoption of a crushing and pumping method of carrying refuse from tipple to dump.

RESEARCH WORK

+ Takes Firmer Hold in 1936

THOUGH the number of institutions reporting increased rather than diminished in the past year, yet the number of research projects *Coal Age* lists this year drops to 226, as against 254 in the preceding twelve months. Nevertheless it must not be supposed that interest in research declined, except perhaps in projects relating to anthracite. More of the year's work was performed by full-time graduate chemists who gave to the research their intensive thought and resources. Only by such well endowed research can speedy progress be made.

During the year, Bituminous Coal Research, Inc., affiliate of the National Coal Association, got fully under way, and the Coal Research Laboratory of the Carnegie Institute of Technology made a tentative report of its activities to the supporters of that institution. The latter seems likely to extend its significant activities for at least five more years. For the first time, at its report session it ventured to visualize the possible commercial outcome of its work and show how its fundamental research fits into the picture of new industries and improved methods. But in the past year the Anthracite Institute was less active than before.

Bituminous Coal Research, Inc., has determined that the top size of coal in domestic and other small stokers need not be greater than ¾ or at most 1 in. To put nut sizes into such coal only gives the worm in the stoking equipment an opportunity to crush the coal, thus increasing the power wasted in such crushing. Moreover, by shipping a wide range of coal to the consumer for stoker use, opportunity is given for the large and small coal to become segregated between loading at the mine and delivery at the consumer's bin, with consequent interference with the smooth working of the stoker. Oil treatment does not prevent crushing.

"Spires," or "trees," of coke formed during the combustion period, declares Bituminous Coal Research, are undesirable, only when the coke, when it breaks, falls out of the gas stream where it cannot be burned. Probably, however, even the most strongly caking coal can be burned satisfactorily in a stoker, if retort and tuyeres are modified to suit the type of coal to be burned. A change in the size range will also change the caking or coking characteristics, but what that range should be varies with each coal.

As, with most underfeed stokers for the firing of coal in domestic or small industrial boilers, the ash moves out of the retort onto a refractory or cast-iron hearth where it is removed as clinker with a pair of tongs, some coal of high-grade quality, having a high-temperature fusing

ash that refuses to clinker, is found to give difficulty. Bituminous Coal Research made studies of means of rendering this coal ash readily fusible at the temperatures of firing provided in mild weather, and found borax best suited for the purpose in the one test made. However, even in mild weather it is best not to expend the 50c. per ton necessary to make such coal clinker, but to use the coal in a stoker designed to remove automatically the non-clinkering ash. Sodium metasilicate, portland cement, glauber salt, soda ash, water glass and borax were used as clinkering agents, but soda ash and water glass decreased clinkering and glauber salt had little effect. All these tests were made at Battelle Memorial Institute.

At Pennsylvania State College it was found that, given the appropriate treatment, the entire coal mass when submitted to hydrogenation was converted into liquids and gases except the fusain and mineral matter, thus giving a ready means of determining the fusain content. Of course, the mineral matter includes both the inherent and extraneous impurities. If the most favorable conditions of temperature, hydrogen pressure and dispersion-agent concentration are not provided, it will be found that some of the vitrain fails to be converted to pitches, liquids and gases.

Varied Hydrogenation Yields

Pitch yields decrease when the temperature is raised, the pitch apparently being converted to liquids. Heavy oil yields are practically independent of temperature or of the type of coal treated. With low fixed carbon in the coal more liquor is produced. Gas yield increases steadily as the temperature is raised to 460 deg. F. and above that temperature a still more marked increase in gas formation is noted. All samples of coal appear to absorb about the same quantity of hydrogen at the same temperature and increases in temperature increase absorption up to 842 deg. F., but in general the increase at higher temperatures may be explained by gas formation.

As a result of the research at the Coal Research Laboratory of the Carnegie Institute of Technology a patent was filed for a novel method of high-vacuum distillation. A patent may be sought also on a means of controlling the burning rate of a domestic stoker by recirculation of flue gases; another would use the "coke tree," or "spire," and a large air-admission area to obtain a uniform fuel bed without resorting to such agitating devices as must be exposed to the destructive heat of the fuel bed. A third patent would cover pretreatment of coal for hydrogenation; a fourth, a method of producing high-molecular-weight phenolic substances from coal; a fifth, a method of production of mellitic acid; and a sixth, a means of hydrogenating coal.

Possibility of preparing compounds of commercial interest from coal and chlorine is held by the Coal Research Laboratory to have little likelihood of realization. Studies on the influence of rate of heating and maximum temperature on the properties of products obtained from coal were reported in *Coal Age*, January, 1937, p. 21. "True" density of coal and coke has been determined by the combined use of helium and mercury, thus determining not only the volume of pores 6 mu and larger in diameter but also the volume of the fine pores into which helium will enter. Helium is used because it will not be absorbed—that is, will not be densified or "concentrated" on the surfaces of the coal or coke being examined. The results of studies of the mechanism of combustion of solid fuels have also been described in *Coal Age*, January, 1937, pp. 21 and 42.

Tests have been made by the aforesaid laboratories to deoxygenate coal by aqueous alkali so as to reduce, during hydrogenation, the waste of hydrogen resulting from the formation of water, at the same time making a product that will be as easily hydrogenated—as regards time, temperature, etc.—as the original coal. The investigators had in mind also a determination of the bonds linking the oxygen with the other atoms of the coal substance. Plans are laid for making alkali treatments in presence of hydrogen or of hydrogen carriers such as phenol and for discovering a catalyst that, in the presence of an alkali, will cause the coal to combine with hydrogen.

Depolymerization, says the Coal Research Laboratory, is the first action of heat, in the presence or absence of solvents. This is followed by decomposition of the units, after which distillation and condensation compete in the disposal of the fragments. The units of structures of Edenborn (Pa.) coal are substances which contain from two to more than seven condensed rings, the distribution being such that the average molecular weight is 300. The average size of the units or "building blocks," as determined by equivalent weights of the humic acids prepared by oxidation of the coals, increases from Illinois No. 6 coal, to High-Splint coal, to Edenborn coal, to Pocahontas No. 3 coal. Rate of oxidation follows in the same order. These and other relations are shown in an acompanying tabulation.

Petroleum consists of a number of compounds of different viscosities, boiling points, solidification points, stabilities, specific gravities, fluidities, oilinesses and resistance to oxidation, decomposition and polymerization. The National Bureau of Standards is endeavoring to separate these compounds by distillation, crystallization, extraction and adsorption, much as the petroleum industry has endeavored to do for many years. If those compounds which are best suited for lubrication could be segregated, a good lubricant might be obtained for any given range of conditions.

Changes in Characteristics With Coal Rank and Nature

Characteristics	Rate of Increase →
Molecular weights	Ill. No. 6, H.-S. coal, Edenborn, Poca. No. 3
Oxidation rate	Ill. No. 6, H.-S. coal, Edenborn, Poca. No. 3
Chemical unsaturation	H.-S. coal, Poca. No. 3, Ill. No. 6, Edenborn
Active hydrogen	Poca. No. 3, Edenborn, Ill. No. 6, H-S coal
Ease of depolymerization with solvent extraction	Poca. No. 3, H.-S. coal, Ill. No. 6, Edenborn
Effects of rate of heating on carbonization yields	H.-S. coal, Poca. No. 3, Edenborn, Ill. No. 6.

H.-S., or High-Splint, coal has 36.4 per cent volatile matter; Illinois No. 6, 33.9 per cent; Edenborn coal, 33.6 per cent, and Pocahontas No. 3, 15.3 per cent. H.-S. coal has 2.9 per cent moisture; Ill. No. 6, 6.7 per cent; Edenborn coal, 1.9 per cent, and Poca. No. 3, 0.8 per cent.

In general, for a given number of carbon atoms in the molecule, viscosity increases with increase of the molecular complexity whether by more branching in the side chain, by the substitution of shorter side chains for a larger one or by greater cyclization of the nucleus. Hydrogenation of unsaturated cyclic nucleuses slightly increases viscosity, whereas unsaturation, by the introduction of a double bond in the side chain, in a measure reduces it. Perhaps by experiment an oil may be produced that will be better than any petroleum fraction now available.

Studies of the synthetic oils may also serve to disclose the fraction or the synthesis that will give the more ideal oil for each specific purpose. With liquids as viscous as lubricating oil, simple refrigeration does not suffice to form crystals, and sometimes no crystals can form. Solvents must be used to provide the needed solu-

bility so that the compounds can crystalize.

During the last year, studies have been continued at the University of Illinois into the design of scrubbers to remove the small concentrations of sulphur dioxide present in the large volume of the stack gases from industrial furnaces. A grid-type scrubber with small wood laths at proper intervals has been found to give maximum scrubbing efficiency, with minimum power consumption, and a scrubber of only slightly larger diameter than the stack itself and only 15 to 20 ft. high will remove 99 per cent of the sulphur compounds in the combustion gases. A new solvent cycle has been developed, and the operation of a pilot plant has shown that sulphur compounds can be recovered at cost competitive with that for the same compounds derived from brimstone.

Coke From Non-Coking Coal

Vitrain has long been known to coke well, durain badly or not at all, and fusain, especially in fine size, to spoil coke if in excess of a small quantity. The durain of the Montana coal tested at the Montana School of Mines did not coke at all. Most of the vitrain from the Belt coal field had too much ash for metallurgical coke. This has been reduced, however, by the use of potato starch, terpineol and kerosene as flotation mediums. With coal from the Brodie mine, generally lower in ash than the Belt coal, and with flotation with kerosene, coal-tar oil and terpineol, a 64 per cent yield of good coking concentrate was obtained with 27.5 per cent of high-ash middling for fuel purposes—and this from the fine coal only, which is not as clean as the coarser coals.

During the present year the University of Minnesota will erect a pilot plant for the production of high-hydrogen water gas from lignite. In studies made by Colorado State College it was found that under the conditions at the college a 25 to 28 per cent saving was effected by using Colorado powdered lignite, and about a 50 per cent economy with powdered northwestern Colorado bituminous coal, over slack used with chain-grate stokers. With this as a guide, half the stoker equipment is being changed to equipment using pulverized coal.

Catalysts present in the low-temperature tar distillates from the North Dakota lignite of Dickenson, N. D., as distilled by the Lurgi process, enable the distillates to react slowly with formaldehyde and form a plastic solid in 330 minutes, too slow to be practical; but with stannic chloride pentahydrate added, the time can be speeded to 2 minutes. Sodium chloride (common salt) will reduce the normal time to 25 minutes.

Pike's Peak lignite or sub-bituminous coal will carbonize almost completely between 932 and 1112 deg. F. Between 482 and 572 deg. F. the water is almost entirely eliminated, and the gas evolved is 80 to 90 per cent carbon dioxide. Most of the valuable gas is emitted between 662 and 932 deg. F. All the gas, however, is low in illuminants. When carbonized at high temperatures, the coal becomes powder, according to studies at Colorado College.

Iron sulphide, declares the Illinois Geological Survey, melts sharply at a certain temperature, turning from a solid to a fluid of mercury-like consistency which in itself does not affect the clinkering of the coal, but the iron in it makes the ash run and clinker. The molten iron sulphide distributes itself as discrete particles through the coal bed.

For two samples of the same size from the same piece of coke, the Bureau of Mines found that ignition temperatures are reproducible within 18 deg. F. and the minimum air rate to sustain combustion can be reproduced within 0.2 cu.ft. per hour. Coke, in duplicate carbonizing tests, may give ignition temperatures varying 36 deg. F., despite similarity of conditions. For cokes made from a given coal, the ignition temperature and minimum air rate will increase with carbonizing temperature with some regularity. Ignition properties of cokes bear no consistent relation to rank of coal. Ignition temperatures are almost proportional to minimum air rate.

How Cell Space Operates

For high-temperature cokes, says the same authority, ignition temperature varies regularly with reactivity, but not for medium- and low-temperature cokes. When the cell space is less than 56 per cent, it has little effect on temperatures of ignition, but, with more cellular coke, decrease in cell space increases these temperatures.

Extended tests have been made on 30 widely variant coals by the University of Iowa to determine the "reactive index" or reducing effect of ulmins in cool, using Heathcote's method, which removes relatively inert bitumens by solution in pyridine, digests the solid residue by potassium permanganate at near boiling temperature and titrates filtrate and washings with sodium oxylate. In general, results by that method seem to show marked correlation between the permanganate number thus obtained and the coal rank, and this may be a means of classifying the coal according to the latter.

In cooperation with the Subcommittee on Pulverizing Characteristics of Coal of the American Society for Testing Materials, the Northwest Experiment Station of the U. S. Bureau of Mines, with the University of Washington, has made a further revision in the Bureau's method for estimating coal grindability to adapt the method better to conditions and equipment found in the usual coal-testing laboratory. Preparation of the sample, originally limited to double-roll crushers, has been changed to permit stage grinding by other types of crushers, and the results of the grindability test will now be expressed in terms of a hypothetic standard coal requiring 500 revolutions to grind it so that any given percentage passes through a 200-mesh screen. There is reason to believe that no coal requiring a lesser number of revolutions is to be found in the United States, and the grindability index of this coal is set at 100.

When Western Coke Ignites

Western cokes were found by the same investigatory authority to have an ignition temperature between 860 and 1058 deg. F., depending on the coal used and the coking practice. With beehive cokes, from coals of similar rank, ignition temperatures were the same whether carbonization was effected in 42 or 72 hours or in any intermediate length of time. Under the same conditions, charcoal ignited at 572 deg. F. and electrode carbon at 1220 deg. F. Experiments also have been made with flocculents in the clarification of circulating water at collieries and a flocculent definitely superior to all others tested has been discovered.

Low-temperature distillation of Alabama lignites by the Alabama Polytechnic Institute showed that a good grade of decolorizing carbon could be made from that material. The lignite thus distilled could be used as powdered fuel or briquetted without binder. Some Alabama lignites on partial carbonization can be briquetted without the use of binding material, but other lignite must be preheated to 900 deg. F. before briquetting. Briquets made of lignite heated to the latter temperature will make a nearly smokeless fuel of

high heat value and low cost. At the Virginia Polytechnic Institute, coal slack, either high- or low-volatile, has been placed in a bomb and heated to a temperature suited to the type of coal. Liquid or semi-liquid portions pass through the coal body and coat the coal mass, making a briquet with a breaking strength of 250 lb. per square inch which will not disintegrate in water after three months' immersion.

COAL-RESEARCH PROJECTS IN PROGRESS OR COMPLETED IN 1936 OR PLANNED FOR 1937

Air Pollution: Smoke Abatement

(See also *Safety and Health*)

Elimination of Sulphur From Gas and Smoke*, U.S.B.M.

Flue-Gas Scrubbing to Remove Ash and Sulphur, Arthur D. Little, Inc.

Quantitative Measurement of Smoke (1935)†, Ill.G.S.; R.I.41

Removal of Sulphur Dioxide and Flue Dust From Stack Gases*, Univ. of Ill.

Smoke Abatement*, Mellon Inst.

Smoke Pollution*, Stevens Inst. of Tech.

Urban Air Pollution†, Mellon Inst.

Ash and Clinker

(See also *Combustion, Domestic Furnaces*)

Ash of Iowa Coal*, Iowa Sta. Coll.

Breeze Admixture With Coal,* Phila Coke Co., Brkln. Union Gas Co., Consolidated Edison Co. of N. Y., Rochester Gas & Electric Corp.

Cause of Slag Formation in Furnaces, Adherence of Ash Particles to Refractory and Metal Surfaces*, Univ. of Ill.

Clinker Formation With Utah Coal*, Univ. of Utah.

Combustion of Coal in Residential-Type Mechanical Stokers (1936), N.W.Exp.Sta., U.S.B.M. with Univ. of Wash.

Effect of Inorganic Fusion Materials on Combustion*, Pitts. Exp.Sta., U.S.B.M.

Elimination of Clinker Through Proper Furnace Design†, Anth. Inst. Lab.

Factors Affecting Fusion Temperature of Lignite Ash*, Univ. of N.D.

Fly-Ash Formation With Utah Slacks, Univ. of Utah; Utah Acad. of Sci., Vol. 13, p. 97

Fusibility of Coal Ash in Relation to Clinkering*, Northern States Power Co.

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* Items starred indicate that work on such projects was still continuing at the close of 1936.

† Items marked with a dagger were concluded in that year.

‡ Items marked with a double dagger indicate that a report will probably be made in 1937. Figures shown in parentheses indicate year in which the particular project was started. Absence of notation indicates that informant failed to indicate status of project. Notations following these refer to papers or reports in which these investigations were, in whole or in part, communicated. Certain of the items in the listing might with almost equal propriety be grouped under some other heading. Where the project is of multiple interest, requiring listing in more than one subject group or where it cannot be listed under any one subject, it is placed either under "Surveys" or "Miscellaneous".

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MINE CAPACITY

+ Gains in Bituminous Industry

PRODUCTIVE CAPACITY added to the bituminous total in 1936 through the construction of new mines and the reopening of old operations was in approximate balance with the losses through closing down or abandonment of mining plants in that year. This conclusion is based on the results of a *Coal Age* survey covering all of the bituminous fields of the United States. In all, over 225 changes of status were reported in that class of mines producing 50 tons or more per day in fifteen States. No changes were reported in the other States by the authorities addressed in the survey.

Changes in the producing ability of going mines, it will be noted, were not included in the survey. In most cases, available information indicates, these changes were upward, either through additions to equipment, working places and number of employees, through mechanization of loading or through multiple shifting. The latter practice moved even further out in the limelight in 1936, particularly in connection with mechanical loading. When the increases at going mines are brought into the picture, it seems evident that developments in 1936 were marked by a moderate rise in producing capacity.

Records Vary Widely

But while new or reopened capacity was approximately equal to the closed or abandoned capacity for the country as a whole, results for individual States were marked by wide swings between the gain and loss columns. Illinois, for example, registered a substantial gain in capacity, while developments in West Virginia were marked by a substantial loss.

In the Rocky Mountain States, Colorado showed a loss in daily capacity of 3,200 tons through the closing or abandonment of five operations. Against this, one new operation was reported in the development stage, producing, at present, about 50 tons per day. In Wyoming, two mines with a capacity of 1,100 tons were reported to have reopened. This State, as well as all others, furnishes several examples of programs designed to increase mine output, such as at the Reliance operation of the Union Pacific Coal Co., where additional territory and new equipment are being employed to raise capacity from 1,800 to about 3,500 tons per day. Union Pacific also authorized the development of a new mine in 1937 with a capacity of 5,000 tons per day to take over the production load of the present "B," "C," "D" and "E" mines, which are approaching exhaustion.

Kansas Loses; Missouri Gains

In the Southwest, excluding all mines under 50 tons per day, a loss of 1,250 tons per day was marked up by the closing of seven operations in Kansas. Missouri, on the other hand, showed a gain, mainly due to the opening of the new Bevier strip operation of the Binkley Mining Co. of Missouri, 2,500 tons per day. With two other operations, this brought the Missouri gain up to 3,300 tons per day, against a loss of 300 tons through one operation working out. Oklahoma showed little change (one new mine reported, 700 tons per day; one mine closed, 400 tons per day). Iowa, on the basis of data submitted *Coal Age,* gained 700 tons per day through the opening of two new mines.

One of the largest gains in the survey was marked up in Illinois, where fifteen new and seven reopened operations increased capacity 26,100 tons per day, compared with a loss of 12,400 tons through the closing of thirteen other mines. Strippers played a big part in the Illinois increase, the list including: Central State Collieries, Inc., Little John Coal Co., Sahara Coal Co., Southwestern Illinois Coal Corporation and a number of smaller operations. Indiana also registered a gain, with strippers figuring prominently in the increase. Ten new or reopened mines gave that State a gain of 6,700 tons per day, reports indicate, against a loss of 5,820 tons through closing or abandonment of eleven other mines.

Scattering returns from Ohio and Pennsylvania show, apparently, about an even break in the former State and a slight loss in the latter. And little change was registered on the whole in Maryland. In West Virginia, returns covering 103 operations show a loss through the closing or abandonment of 64 mines of the list of 36,275 tons per day, against a gain of 25,000 tons through 39 new and reopened operations. Northern West Virginia and the Kanawha field figured prominently in the list of new and reopened plants in that State.

Mixed Trends in South

Kentucky apparently lost ground also, as ten mines with a daily capacity of 6,700 tons per day were reported closed or abandoned (exclusive of operations affected by strikes in 1935 Ohio and Muhlenberg counties in western Kentucky and reopened, with some exceptions, in 1936), while six new mines with a capacity of 3,350 tons per day were opened or reopened. Virginia showed a gain in 1936, with one mine at 150 tons per day closed and two opened or reopened at 3,100 tons per day. Probably a still greater gain would be shown were completer reports of activity in the Grundy field available. Tennessee reports showed three new or reopened mines with a daily capacity of 900 tons, compared with three closed operations at 1,350 tons.

This survey was made possible through the cooperation of railroads, State mine departments and secretaries of operators' associations, who supplied many of the data embodied in this article.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Guard Chains and Sprockets On Cutter Truck

To get away from difficulties arising out of damage to chains and sprockets on cutting-machine trucks at the Reid mine of the Reid Coal Co., Inc., where bottom is taken up for height, guards are welded to the trucks, states James Thompson, mine foreman, New Bethlehem, Pa. The Upper Freeport seam at the Reid mine consists of about 32 in. of clean coal underlaid by about 16 in. of boney, making a total height of 4 ft. between top and bottom rock. The cut is made in the boney just under the clean coal, using 35B mining machines, and consequently it is necessary to take up a foot or more of the boney in roadways to provide headroom.

As the 35B truck is driven by endless chains that extend from one sprocket to another, and as these sprockets are located on the extreme end of the axle outside of the wheel and extend about 7 in. out from the gage side of the rail, much difficulty from wear and tear and breakage of drive chains was experienced in the past because channeling of the bottom in rooms was not wide enough to clear the drive chains properly. To overcome this trouble, says Mr. Thompson, two pieces of iron were cut from a discarded drawbar and then were welded together to form a V-shaped guard. The open, or winged, ends of the Vee were welded to the bottom of the machine truck immediately inby the front sprocket. The guard in effect is a cowcatcher in front of the sprockets and chains, and as it extends 9 in. out from the gage side of the rail, or 2 in. beyond that necessary for proper clearance, complete protection is provided. Use of the guard also convinced the miners that channeling must be of the proper width to accommodate the guard if they wanted their places cut, and consequently chain trouble has since disappeared.

—◇—

Track Crossing Made From Discarded Cutter Parts

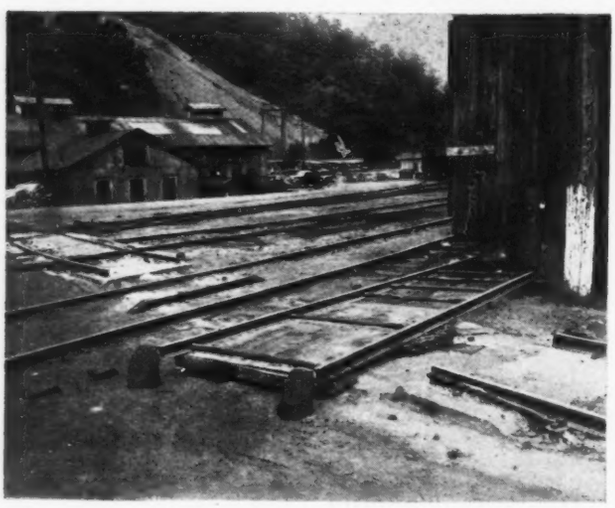
Crossing the railroad main line with a narrow-gage track to connect the mine opening with the shop and supply yard was a problem recently solved at the Sharples (W. Va.) mine of the Boone County Coal Corporation by construction of a turntable crossing. The expense of a permanent stationary crossing of the type which would conform with the railroad-company standards had never been authorized. Although classed as a main line because at one time it served mines farther up the hollow, the railroad track now serves only to bring empties to the Boone County tipple.

For some years a single jackknife or bascule section of mine track was used, but it had the objections of being difficult and none too safe to raise and lower and of requiring a high structure to support the rope sheaves. That arrangement was replaced with the turntable crossing here illustrated. The turret and circle of a discarded 29B arcwall mining machine was used for the turntable proper. Its easy-running qualities and rigid concrete-base mounting make it possible for one man to swing the crossing track to either position.

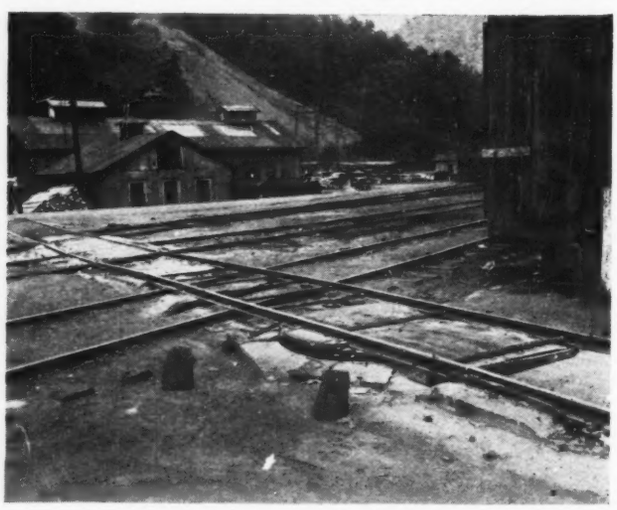
Matched ends of the rails are beveled so that they stop the turntable in the proper position and the rail-end lengths are proportioned so that they clear each other during the swing. Sliding keys operated by switch throws tie the matched ends together.

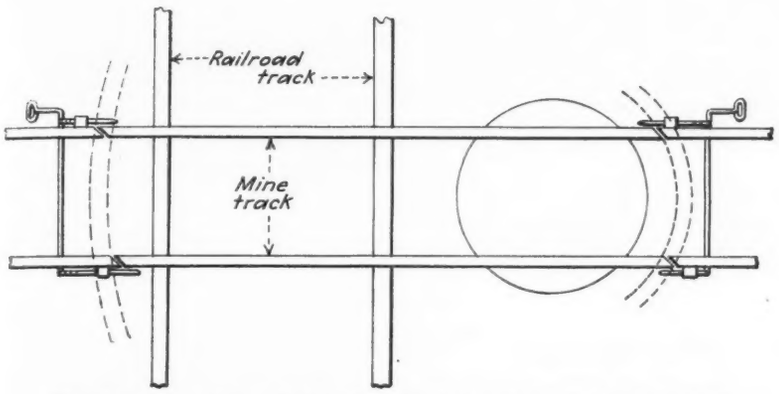
When the table and track are in the parallel or out-of-service position a

Turntable crossing locked in the out-of-service position



Keys operated by throws hold crossing in service position





Showing respective rail lengths, beveled ends and keys operated by switch throws

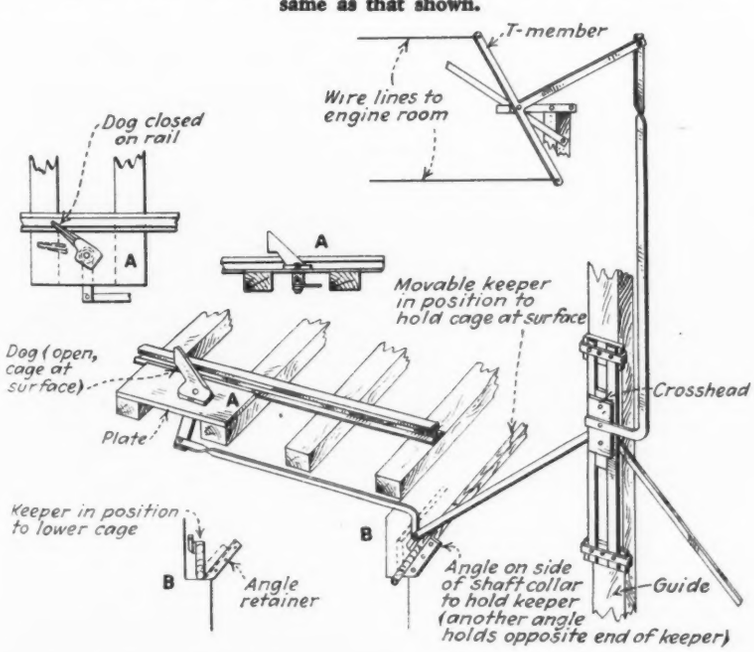
sliding bolt attached to a permanent post is dropped to engage the track and then it is padlocked, thus insuring against tampering or unauthorized use. Wooden posts with upper ends having one side beveled and protruding 8 in. above the ground act as guards for the ends of the table rails.

Service Shaft Guarded When Cage Is Down

To eliminate the possibility of cars or other equipment dropping into the shaft when the cage is not at the surface and possibly taking men with them, the device shown in the accompanying diagrammatic sketch is used at the man and materials shaft at the American No. 2 mine of the Knox Consolidated Coal Corporation, Bicknell, Ind. Details are supplied by Thomas James, mine manager.

At this shaft, the cage is supported when at the surface landing on two wings, or keepers, one on each side of the shaft. These keepers, made of 2x12-in. oak, extend across the shaft from one side to the other. The keepers are mounted on shafts along their bottom edges, which permits them to pivot in recesses in the shaft collar. When the cage is at the surface, the keepers rotate out from the shaft wall and rest on angle-iron retainers, one at each end of a keeper. These retaining angles are fastened to the sides of the shaft. The cage then is dropped down and rests on the keepers. When material or men are to be lowered, the cage is raised slightly and the keepers are rotated back into their recesses, thus clearing the shaft and permitting the cage to be lowered.

Details of device for preventing equipment from running into shaft when the cage is below. Construction on the opposite side of the shaft is the same as that shown.



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News

• News is defined in Webster's New International Dictionary as "A report of a recent event; information about something before unknown; fresh tidings; recent intelligence." Information on a new or better way of doing the various tasks involved in running a coal mine is, of course, news to operating, electrical, mechanical and safety men, and this is the guiding principle in selecting material for this department of Coal Age. We therefore solicit cost-cutting, time-saving and safety-promoting ideas developed by the men at the mines. Send yours in, together with a sketch or photograph if it will help to make the idea clearer. For each acceptable idea, Coal Age will pay $5 or more.

★ ★

As a safety measure, a dog is placed on one rail on each side of the shaft to stop equipment before it can roll into the shaft when the cage is down. Action of the dogs is synchronized with that of the keepers to open or close the dogs automatically, depending upon the position of the cage—that is, when the keepers are in one position, the dogs are in the other, and vice versa. Selection of the keeper position, and consequently the position of the dogs, is left, however, to the hoisting engineer. By pulling a lever in the engine room, the engineer, through a system of wire lines and a T-member attached to an operating rod (see sketch), moves a crosshead operating in false guides fastened to the outside of the regular cage guide. Rods from the crosshead to the keepers rotate the keepers in or out in accordance with the position of the crosshead, while subsidiary rods from the keepers to operating arms on the dogs move them to a corresponding position and either clear or obstruct the rails in accordance with the cage position. By interposing blocks of suitable thickness between the false guides and the regular guide, sufficient space is obtained to permit passing the operating rods behind the false guides to the crosshead pin.

Dogs can be made of 10x8x1-in. iron formed and cut to the proper shape. The short shafts to which the operating arms are attached can be made of any junk shafting of 1 in. or so in diameter. One end of the shaft is passed through a hole burned in the base of the dog and it then is welded in place. The operating arm, of common bar stock, is drilled and pinned to the

opposite end of the shaft at the correct angle—determined by experiment—to get the desired action. The dog is mounted on a 1-in.-thick plate of suitable dimensions, which is bolted to the ties alongside the rail. In assembling the dog and plate, the shaft is first passed through a hole of the proper size in the plate. A sleeve of pipe cut to the proper length to fit snugly in the space between the bottom of the plate and the operating arm then is slipped over the shaft, after which the operating arm is pinned in position. The operating rod from the keeper then is attached. False guides, operating rods or levers and the T-member are made of suitable bar stock. The T-member is mounted on a suitable support and high enough so that the wire lines to the engine room will not interfere with traffic.

Hints From a Shopman's Notebook; Switch and Frog Manufacture

By WALTER BAUM
Master Mechanic, Perry Coal Co.
O'Fallon, Ill.

FLAME CUTTING, a product of the increased use of gas welding and cutting equipment, offers a low-cost method of constructing frogs and switches for mine turnouts. In the following paragraphs I will discuss a method I worked out about two years ago, using as an illustration a No. 3 frog and switches made out of 25-lb. rail. Frogs and switches made by this method have given better service than those made by the old way of forging and trimming the rails with a hot cutter and, in particular, have proved their advantages in caterpillar-mounted mobile-loader service where the loading machines travel on the rails and where frogs consequently must stand up under the weight and stresses resulting from this practice. In fact, the effect of caterpillar loaders on frogs designed for hand-loading service was the major reason for the development of the type described below.

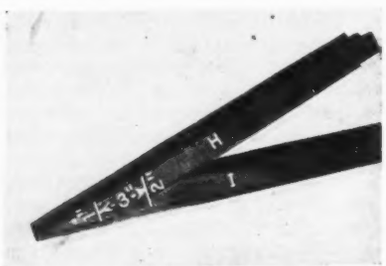


Fig. 1—Rails cut and assembled to make a frog point

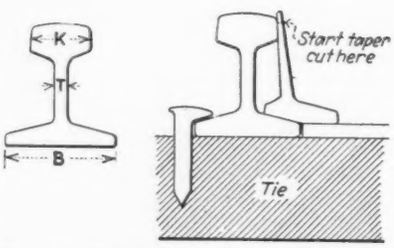


Fig. 2—Showing how switch point fits the through rail

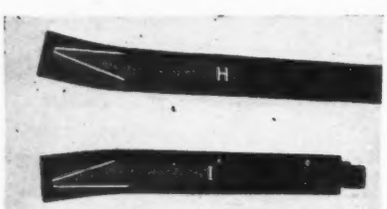


Fig. 3—After bending, rails for frog points are marked off on the top as shown above

A method of determining the frog number is illustrated in Fig. 1. This is done by first measuring back from the point until the width is 1 in.; next by measuring back until the point width is 2 in. The distance between the two lines then is 3 in. for a No. 3 frog.

When manufacturing frogs by this method, it will be found cheaper to make 25 frogs and 25 pairs of points at one time, as the set-up for making 25 cuts is the same as for making one cut. Another important item is that the measurements of the rails at the ball and web (*K* and *B*, Fig. 2) must be the same in all rails. Also, when cutting the rails for the frogs and points each rail length must be made the same. Otherwise, the angle of the cuts will not be the same in each case (when holding the rails with the rail holder and a stop gage).

As a means of determining the angles of the bends in the rails to be used for the frog points and switch points I would suggest that actual-sized drawings be made on flat sheets. In preparing to make a frog, after measuring the rails to be used at *K*, *B* and *T* (Fig. 2), first draw the two outside lines *K-O* as in Fig. 8 to the angle of the frog to be made. Next, draw the line representing the inside of the ball of Rail *H*. Where this line meets Line *K-O* of Rail *I* is the point where the bend is to be made. Next, the dotted lines representing the web of the rail, *T*, are drawn up to the point of the bend and then are angled off to the point of the frog, which is the extension of Line *K-O* of Rail *H*. This angle is the angle of the bend in Rail *H*.

The bend in Rail *I* is made at the point where the Line *K-J* of Rail *I* meets Line *K-J* of Rail *H*. From this point the dotted lines representing the web of Rail *I* are drawn out to center over Line *K-J* of Rail *H*. Lines *K-O* and *K-J* then are drawn out as shown in Fig. 8. From this drawing the starting points of the cuts in the bases of the rails can be determined. After making the actual-sized drawing of the frog points, patterns can be made incorporating the desired angle of bend and length from the bends to the ends of the rails and numbered with the frog number. The same also can be done for the switch points and when patterns are made it is unnecessary to make other drawings.

After bending the rails for the frog

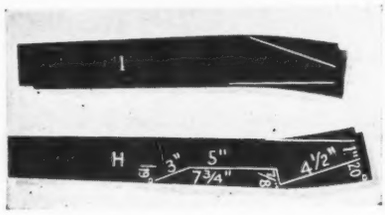


Fig. 4—Showing how the bottoms of rails for frog points are marked off

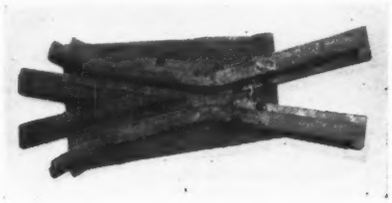


Fig. 5—Complete frog assembled with bolts

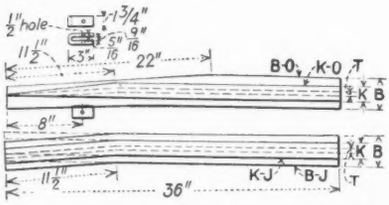


Fig. 6—Two stages in the construction of a switch point

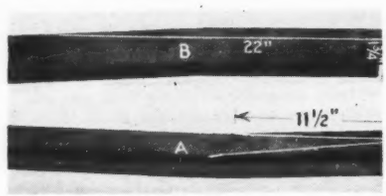


Fig. 7—How a switch point is marked off prior to flame cutting

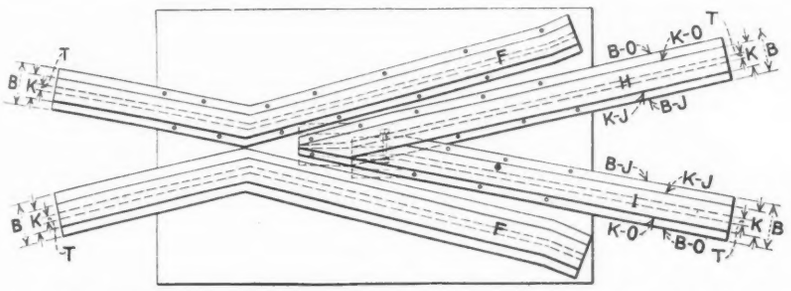


Fig. 8—Showing how the points where bends must be made in rails for the frog point are determined

points, one pair of them are marked like the rails in Fig. 3 as a guide in setting the cutting torch. The two rails then are turned over and marked on the bottom as in Fig. 4. The two end cuts on Rail *H* in Fig. 4 can be made with the power-driven torch and then finished with the hand torch. Only one irregular cut is made for each frog and after making the first a pattern can be made to mark off this part of the rail. After making all the cuts on the top and bottom of Rails *H* and *I* they should fit up as in Fig. 1 without grinding or matching. Holes for the $\frac{5}{8}$-in. bolt through the webs shown in Fig. 8 can then be drilled. The angle of the bends in the guide rails can be obtained from the drawing (Fig. 8). The sharper these bends are the better the frog will be.

Fig. 5 shows a completed frog bolted to a $\frac{5}{16}$-in. steel plate with about 25 $\frac{1}{2}$x1$\frac{1}{4}$-in. machine bolts. Rivets can be used or the frog can be electrically welded to the plate. However, I prefer bolts, as with them it is necessary only to assemble the parts, while if the frog is riveted it is necessary to bolt the rails in place to permit riveting. Length of Rail *I* is 20 in.; Rail *H*, 24 in.; and the two guide rails, 34 in. each.

As in the case of the frogs, the first step in making the switch points is the preparation of a drawing to obtain the angle of the bends that must be made in each. I make the bends 11$\frac{1}{2}$ in. from the end. On the drawing (Fig. 6), the dotted lines representing the web are angled over to bring the center over the extension of Line *K-J*, representing the outside of the ball of the rail. This is the angle of the bend, which is the same on both the right- and left-hand points. After the bends are made one pair of rails are marked off as shown in Fig. 7. This pair is used to set the torch by. There is one cut to be made on the bases of the points, this on what will be the inside after the cut is made. In making this cut, the rail is held so that the bottom can be cut off on the same angle as the top side of the base of the through rail so that the two will fit together as in Fig. 2. The top of the point should be trimmed off starting down at the dotted line in Fig. 2 and tapering back to the top of the rail 6 in. back from the point. A piece of strap iron is used to support the overhanging part of the switch point. It also permits the points to move freely on the tie.

To complete a point a loop is made of $\frac{5}{16}$x1$\frac{3}{4}$-in. mild steel and welded to the point with the open end toward the back of the point. A $\frac{1}{2}$-in. hole is drilled in the loop for attaching the bridle.

[*Methods of flame-cutting the rails and jigs used to hold the torch and rails will be described in a subsequent issue of Coal Age.*]

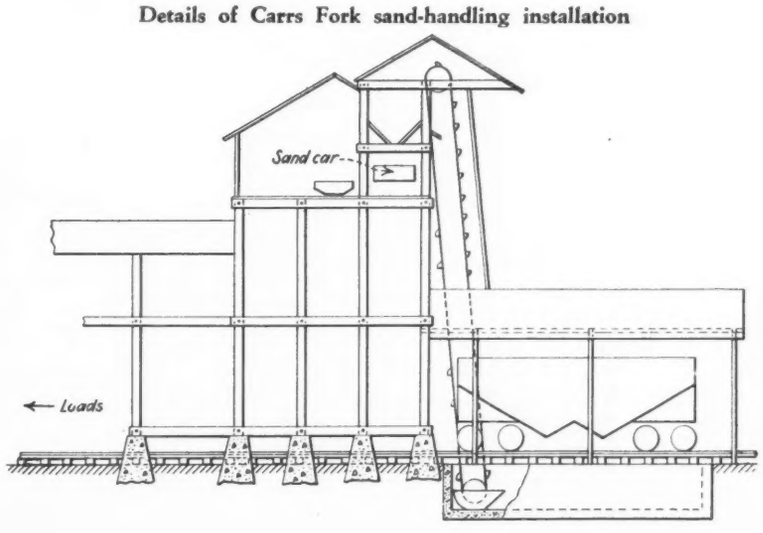
Sand-Handling Installation Returns Cost Biennially

By changing the system of receiving and handling sand at the Allock (Ky.) operation of the Carrs Fork Coal Co., sufficient economies were made to return the cost of the new installation every two years, writes P. A. Grady, general superintendent. Until the present system was installed, sand was unloaded from gondola cars into a wooden bin above the tipple. From the bin the sand was wheeled by barrow to a small skip and then was hoisted to the mine track on the tipple above. Considerable labor was involved.

To make way for another track under the tipple, on which treated stoker coal was to be loaded, the old sand bin had to be moved and, instead of building another on the same order which would require the same labor, the idea shown in the accompanying sketch was worked out. A concrete bin large enough to hold one and one-half railroad carloads of sand was constructed under the nut-and-slack track. Instead of ordering sand in gondolas, hopper cars were called for. These permit running the sand out into the bin in time to allow the car to follow under the tipple and be loaded with coal.

The sand bin is wide enough to permit a small-capacity bucket elevator to operate between the side of the car and one side wall of the bin. This elevator carries the sand up to a small hopper on top of the tipple. A valve in the bottom of this hopper lets the sand out into a car that distributes it to the various gathering-locomotive sections in the mine. By means of another pipe and valve, locomotives can be sanded under the hopper.

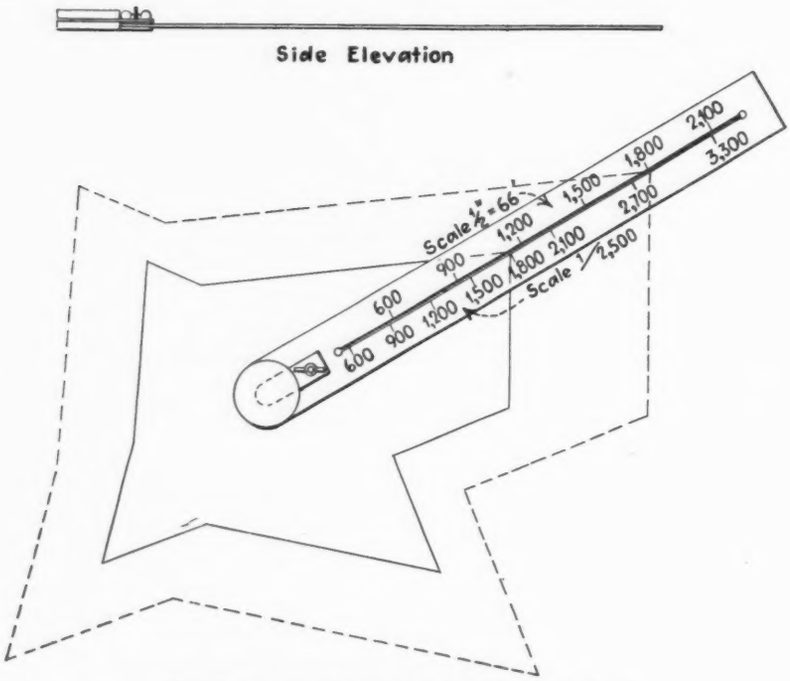
Details of Carrs Fork sand-handling installation



Plan Enlarging

More accurate enlargement of plans is the objective of the instrument shown in the accompanying illustration, which was designed by P. W. Brown, M.E., mining department, the Fife Coal Corporation, Ltd., Cowdenbeath, Fifeshire, Scotland. The instrument consists principally of a brass headpiece on which the scale revolves. The headpiece is held in place on the plan by means of a weight. Suitable celluloid scales are made to insert in the revolving part. In the middle of each scale is a slit (see figure) on either side of which are stamped the respective scales.

The illustration shows scales of 25 in. to the mile to 40 in. to the mile, the one being the scale for ordnance plans and the other the general scale for mining plans in Great Britain. Measurements are made directly and the method, Mr. Brown states, is more ac-



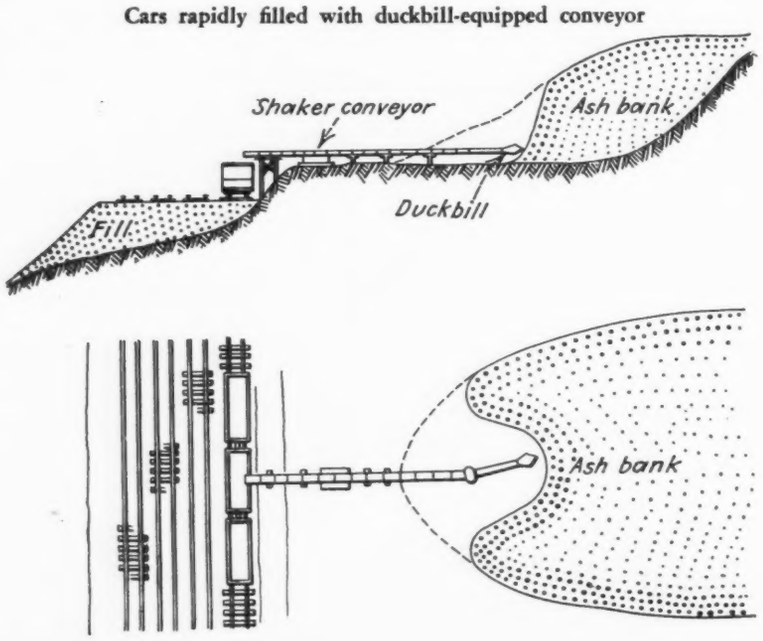
Showing use of instrument in enlarging plans

curate than either pantograph or eidograph. Suitable scales may readily be inserted and held in position by means of pins and the thumbscrew. The use of celluloid for the scale permits the junction of lines to be seen readily. The method of operation is shown in the accompanying figure.

Ashes Loaded by Duckbill

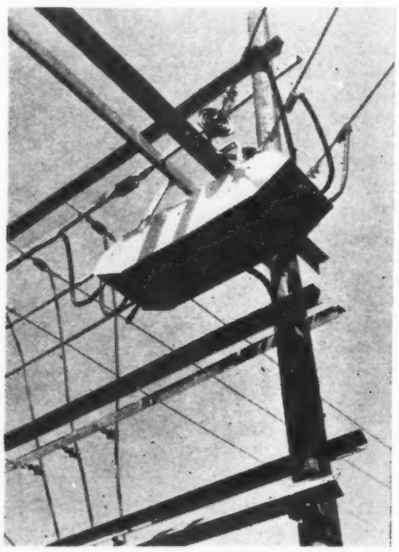
Those who have duckbills available can apply them to many purposes on the surface as well as underground. At one mine of the Lehigh Valley Coal Co. a large pile of ashes had to be loaded into railroad cars in order to extend a railroad yard. If done by hand labor, the work would have been slow, would have involved much labor, more than then available; so to meet the exigency the superintendent ingeniously brought a duckbill-equipped shaker conveyor from inside the mine and set it up on the surface, and with it dug, loaded and conveyed ashes from the pile into railroad cars, which were then pulled to the location where the ashes were dumped. Two men with this equipment loaded 250 railroad cars from the bank at an average speed of one railroad car per hour.

Cars rapidly filled with duckbill-equipped conveyor



Protect Indoor Transformers By Inverted Steel Boat

Use of an inverted boat-shaped weatherproof steel cover for adapting indoor instrument transformers to outdoor use saved the cost of new outdoor transformers on a 2,300-volt distribution tower recently built by the Boone County Coal Corporation, Sharples, W. Va. The tower was



Protected from rain but open for inspection

erected in connection with a recent revision of the power-distribution system and the transformers were required for an installation of check meters.

The inverted boat is hung just below the steel angles to which the strain insulators of the feed lines are attached. Incoming and outgoing connections loop down around the ends and into the boat. No protection is required over the lower side of the transformers.

Finding Flaws in Tools

Magnetic methods of finding flaws in hand tools such as hammers, chisels, rail cutters, etc., are employed by one large coal-mining company, reports *Engineering Safety*, the bulletin of the American Society of Safety Engineers. The head of the tool is first dressed on an emery wheel, and when dressed there may not be any cracks visible. The tool then is magnetized and dipped in iron filings. The filings will adhere to the head except where there is a crack. This makes the crack, which otherwise cannot be seen, visible to the eye.

WORD FROM THE FIELD

Cowan Is Program Chairman For A.M.C. Convention

Modern methods of mechanical mining and efficient operation to provide fuel for homes and industries at the lowest possible cost are to be emphasized at the fourteenth annual convention of Practical Coal Operating Men and National Exposition of Coal Mining Equipment, to be held May 17–20 at Cincinnati, Ohio. The technical sessions and exposition will be held, as in past years, in the Music Hall, and Julian D. Conover, secretary of the Mining Congress, said that an impressive array of up-to-date equipment will be shown.

C. E. Cowan, vice-president, Monroe Coal Mining Co., Greensburg, Pa., has accepted the chairmanship of the national program committee, which is working out details of the program at a series of sectional meetings. District chairmen of the committee include: Pennsylvania—T. F. McCarthy, general superintendent, Clearfield Bituminous Coal Corporation; Ohio—F. G. Smith, assistant general superintendent, Sunday Creek Coal Co.; Illinois—G. Stuart Jenkins, general superintendent, Consolidated Coal Co.; Indiana—W. H. Stewart, general superintendent, Central Indiana Coal Co.; West Virginia—E. B. Agee, superintendent, Youngstown Mines Corporation; Kentucky—E. R. Price, mine superintendent, Inland Steel Co.; Virginia—J. J. Sellers, vice-president, Virginia Iron, Coal & Coke Co.; Rocky Mountain—W. C. Stark, general manager, Blue Blaze Coal Co., Salt Lake City, Utah.

Mapel Sterling Mines Reopen

Mapel Sterling Coal Co.'s Nos. 1 and 2 mines, at Dilliner, Greene County, Pa., reopened on Jan. 4, according to an announcement by the company. With extensive improvements to underground equipment and tipples, including shaking screens and loading booms, the operations are expected to produce 1,500 tons daily.

Automatic Heat Shows On

Automatic heating exhibitions under the auspices of Anthracite Industries, Inc., are to be run in quick succession, beginning with a permanent exposition in New York City about Feb. 1. In cooperation with a number of equipment manufacturers, the permanent New York show will be on the ground floor

of the Architects Samples Building, 101 Park Ave. Other exhibitions will be held Feb. 13-20 in connection with the National Home Show under the direction of the Federal Housing Administration at the Philadelphia, (Pa.) Commercial Museum; March 6-13, at Buffalo, N. Y., under the same auspices; April 3-10, Baltimore, Md.; April 24-May 1, Mechanics Hall, Boston, Mass.; Sept. 19-25, Springfield, Mass.

Keeping Step With Coal Demand

Bituminous Production

	1936 (1,000 Tons)	1935* (1,000 Tons)
Dec. 5	10,258	8,379
Dec. 12	10,556	8,274
Dec. 19	10,374	8,487
Dec. 26	7,900	6,883
Jan. 2, 1937	8,730	8,288
Jan. 9	10,263	9,095
Total to Dec. 31.	431,950	369,324
Month of Nov.	41,588	33,404
Month of Dec.	44,487	35,388

Anthracite Production

Dec. 5	1,251	1,147
Dec. 12	1,188	1,096
Dec. 19	1,039	952
Dec. 26	885	863
Jan. 2, 1937	842	1,220
Jan. 9	1,196	1,300
Total to Dec. 31.	54,760	52,158
Month of Nov.	4,387	3,233
Month of Dec.	5,180	4,726

* Outputs of these columns are for the weeks corresponding to those in the preceding year, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

	(Thousands of Net Tons) Dec. 1 1936	Nov. 1 1936	Dec. 1 1935
Electric power utilities	6,859	6,473	6,438
Byproduct ovens	8,146	7,296	6,129
Steel and rolling mills	1,103	1,033	958
Railroads (Class 1)	5,116	4,865	5,865
Other industrials*	10,371	9,736	11,151
Total	31,595	29,403	30,541

Bituminous Coal Consumption

	(Thousands of Net Tons) Dec. 1 1936	Nov. 1 1936	Dec. 1 1935
Electric power utilities	3,506	3,735	3,071
Byproduct ovens	5,811	5,844	4,488
Steel and rolling mills	1,195	1,168	974
Railroads (Class 1)	7,665	7,547	6,640
Other industrials*	11,396	10,684	9,033
Total	29,573	28,978	24,206

* Includes beehive ovens, coal-gas retorts and cement mills.

Operators Deny Lewis' Charge Of Breaking Wage Pact

Appalachian operators flatly denied on Jan. 5 that there was any truth in the assertion by John L. Lewis, president, United Mine Workers, in a New Year's Eve radio broadcast, that the producers had breached the existing contract by suggesting a renewal of present rates of pay adjusted to the basis of an eight-hour day, five-day week. In his address over a National Broadcasting Co. network Mr. Lewis declared that the operators, "prodded and goaded by the financial interests dominant in steel, automobile and other major industries, had taken an amazing action without public rebuke or criticism."

Despite the provision in the present agreement binding the producers and the union to meet on Feb. 17 to consider what revisions shall be made in the contract, said Mr. Lewis, the Appalachian operators formally notified the miners' union on Dec. 15 "that they had already met among themselves and decided upon the wages, hours and conditions of employment affecting the mine workers for an additional two-year period" (January *Coal Age*, p. 36). Since the operators had formally breached the agreement, he added, "It is obvious that the United Mine Workers have an equal right, at will and without notice, to denounce its provisions and withdraw their members from the mines of the defaulting operators."

The reply of the operators' negotiating committee of the Appalachian wage conference was as follows:

"There is not a particle of truth in the assertion by John L. Lewis, president of the United Mine Workers, in a New Year's Eve radio broadcast, that the existing wage contract between the operators and the mine workers in the bituminous coal industry has been breached by the operators. The contract which was signed in 1935, and which expires on March 31, 1937, is in full force and effect. No one knows this any better than Mr. Lewis.

"The operators, in advance of the official conference scheduled to be held in New York City next month to negotiate a new contract, have tendered to the president of the United Mine Workers as the basis of these negotiations certain proposals respecting the terms of a new two-year contract. To assert, as did Mr. Lewis in his radio address, that this action constituted a violation of the present contract, and entitles the United Mine

Workers at will and without notice to withdraw their men from the mines and quit work, if Mr. Lewis so orders, is utterly preposterous.

"There is not the slightest excuse for a disruption of the nation's winter fuel supply except as an adjunct to Mr. Lewis' larger objectives. Apparently Mr. Lewis, regardless of the existing contract, is manufacturing a pretext for shutting down the coal mines of the Appalachian fields that furnish two-thirds of the nation's bituminous coal supply, and on which the automobile, steel and glass industries depend for fuel, if such a paralyzing midwinter shutdown will further his plan to dominate these industries.

"In this connection Mr. Lewis within the past two weeks has levied upon his United Mine Workers an extra million dollar assessment, which the operators have been notified to take out of the miners' pay envelopes and remit to the union along with the miners' regular dues. His official notice states that this special million dollar levy is in part at least to provide further funds for his C.I.O campaign.

Operators Decry Lewis Charges

"The negotiating committee for the coal operators in the Appalachian field will not permit Mr. Lewis to place upon them the responsibility for any suspension of work in the coal mines coincident with the widespread disturbance of employment conditions in other major industries of the nation."

Commenting on the operators' statement on Jan. 11, Mr. Lewis said that a strike would take place only if the operators refused to negotiate for a new agreement. "Industrial groups threatened with strikes are trying to work up a united front," he added, "and it looks as if the coal operators' letter might be a part of that—designed to 'keep John Lewis busy at home.' It is entirely within the realm of possibility that they are throwing a colossal bluff, in which case there won't be likely to be any trouble."

An official call, signed by D. C. Kennedy, executive secretary, Kanawha Coal Operators' Association, as chairman, and Thomas Kennedy, secretary-treasurer, United Mine Workers, as secretary of the joint Appalachian wage conference, was mailed on Jan. 15 to all parties signatories to the Appalachian agreement for a meeting to be held at 11 a.m., Feb. 17 at the Biltmore Hotel, New York City.

Louis Gerdetz, formerly with the Philadelphia & Reading Coal & Iron Co., has been employed by the U.M.W., it is reported, to study mechanical loading and report his findings before April 1.

Permissible Plate Issued

One approval of permissible equipment was issued by the U. S. Bureau of Mines in December last, as follows:

Goodman Manufacturing Co.: Type 142C-04T locomotive; Approval 1527; Dec. 15.

Action on Bootleg Mining Asked by Earle

Seeking to curb the bootleg coal evil in the Pennsylvania anthracite field, Governor Earle, in a message to the new Legislature, delivered in person on Jan. 5, asked for authority to name a commission to work out a settlement of the problem. The Keystone executive presented to the House through Representative John Stank, of Northumberland, a bill authorizing him to appoint the commission, which would have five members, to study:

1. Economic and social conditions in the hard-coal region.
2. Causes underlying the present dislocation of the mining industries.
3. Extent of illegal mining and its causes.
4. Methods by which the economic and social conditions might be alleviated or remedied.
5. Such other matters and affairs deemed pertinent by the commission to secure reliable and accurate facts concerning actual conditions with respect to the anthracite region and its industry.

In his message the Governor said: "In the counties of Northumberland and Schuylkill and to a lesser extent in the contiguous counties, thousands of unemployed men are mining and preparing anthracite coal taken from the lands or leaseholds of legitimate mine operators. It is unquestioned that the legal rights of the mine operators are being violated. It is equally true that the unemployed men engaged in this work have a moral right to earn a living for themselves and their families. It is my opinion that this bootlegging is a symptom of an even greater disease which is destroying Pennsylvania's great anthracite industry, at great loss to those engaged in the industry, to the communities of the anthracite region and to the commonwealth as a whole."

The Governor's plan was the result of a three-day tour, Dec. 20-22, of the hard-coal area infested with outlaw operations, during the course of which he inspected some of the bootleg mines. He also questioned many of the miners as well as public officials, lawyers, editors, clergymen and bankers about a possible remedy. On his return to Harrisburg he said it was out of the question to grant the operators' demand that he send trops to oust the bootleggers. It would cost $30,000 and produce no lasting results, he said, because the bootleggers would return as soon as the soldiers left.

Representative Ellwood J. Turner, Delaware County Republican, announced on Jan. 3 at Harrisburg that he would ask for an appropriation of $1,000,000 to go to a commission to work toward restoring prosperity in the coal areas of the State. The commission would study the effects of the depression in both the hard- and soft-coal fields. Mr. Turner said "production and its consequent employment constitute the first phase of the problem, not only in the anthracite regions but almost equally so in our soft-coal sections, where poverty has reached a stage where local governments are reaching their wits' end in efforts to collect enough taxes to operate. I think it is clear, therefore, that unless government is going to take care permanently of thousands of families, either or both of two things will have to be done: that is, the regions must be depopulated or new industries will have to be brought in."

The House passed the Earle measure unanimously on Jan. 19 and sent it to the Senate for concurrence. Although no votes were cast against the bill, Representative Turner declared that his measure would establish "a commission of action" instead of the administration's "commission of study and inquiry." The administration's bill, he added, "will not terminate this condition nor put a single bootleg worker back into gainful employment."

Further Action in New York

The bootleg traffic into New York City came in for consideration in speeches at the annual dinner of the Anthracite Club of New York, held Jan. 14 at the Hotel Astor. John C. McDermott, Assistant District Attorney who has been gathering evidence in the New York County grand jury's investigation of the outlaw industry, and Matthew J. Diserio, Assistant Commissioner of Weights and Measures, urged the club to support an ordinance pending before the Board of Aldermen which, they said, would end the sale of stolen coal in this city through issuance of a "certificate of origin." One reason his bureau favored the ordinance, said Mr. Diserio, was that truck owners from anthracite regions persistently brought short-weight loads into this city.

Charles J. Reynolds, director of the

Coming Meetings

- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 15-19, 29 West 39th St., New York City.
- Canadian Institute of Mining and Metallurgy: annual meeting, March 15-17, Mount Royal Hotel, Montreal, Quebec, Canada.
- Appanoose County Coal Operators' Association: annual meeting, April 1, Centerville, Iowa.
- Utah Coal Operators' Association: annual meeting, April 7, Salt Lake City, Utah.
- Virginia Coal Operators' Association: annual meeting, April 10, Norton, Va.
- Central Pennsylvania Coal Producers' Association: annual meeting, April 20, Altoona, Pa.
- American Mining Congress: annual convention and exposition, May 17-20, Music Hall, Cincinnati, Ohio.

Bureau of Weights and Measures of the State Department of Agriculture of New York, at Albany, demanded on Jan. 18 that city and county sealers of weights and measures cooperate in stopping the bootleg coal traffic in this State. "Unless a licensed weighmaster has weighed each delivery separately and issued a net weight ticket for each delivery, a violation of the law occurs," he said. "These tickets must bear the name of the seller, the name of the purchaser, the number of pounds of coal and the signature of the licensed weighmaster. Each delivery must be accompanied by duplicate weight tickets, one ticket to be given to the purchaser when delivery is made."

Arrest P. & R. Officials For Mine Disaster

In a criminal action brought by the Commonwealth of Pennsylvania, four officials of the Philadelphia & Reading Coal & Iron Co. at Pottsville, Pa., were arrested on Dec. 24 on charges of willful negligence and involuntary manslaughter in connection with the Gilberton mine disaster, which caused thirteen deaths on Jan. 21, 1935. The prisoners were released on total bail of $65,000. The officials arrested were John R. Sharp, general manager; William E. Jones, superintendent of the Gilberton mine; James J. Keating, foreman, and Samuel W. Blakeslee, production manager.

James Quigley, mine inspector, chief witness for the prosecution, charged that the defendants "unlawfully and willfully, negligently, carelessly and wantonly" permitted firedamp to accumulate in the lower passages of the mine, where more than 75 men were at work. The Commonwealth contends that the company, which is accused with its officers, should have had fewer men working there.

Coal Firm Units Merged

Red Jacket Consolidated Coal & Coke Co., Inc., and Red Jacket Jr. Coal Co. were merged as of Jan. 1 into the Red Jacket Coal Corporation, organized under the laws of Delaware. Officers of the new organization are: E. E. Ritter, president; W. M. Pryor and C. B. Weakley, vice-presidents; Landon C. Bell, secretary and counsel; F. B. McChesney, treasurer. In addition to its Red Jacket mines, in Mingo County, and Wyoming mines, in Wyoming County, West Virginia, the company is constructing a plant to mine the Cary seam in Buchanan County, Virginia.

Consolidation of the Truax-Traer Coal Co., operating in Illinois, with the Truax-Traer Lignite Coal Co., a Northwestern subsidiary with mines in North Dakota, was approved by the stockholders, it was announced on Dec. 28. The official personnel continues without change.

New Guffey Coal Measure Presented; Operators Meet to Draft Bill

WASHINGTON, D. C., Jan. 23—In accordance with the pledge he made during the last presidential campaign, Senator Joseph F. Guffey, Pennsylvania, lost no time after Congress convened in presenting a new coal-control bill. On Jan. 6, the first day of the new session, he introduced it in the Senate. Designated as S. 1, the latest measure closely follows the lines of the preceding Guffey bill, which failed to pass because of a filibuster on the final day of the previous Congress (*Coal Age*, June, 1936, pp. 259-261).

In calling for reestablishment of a National Bituminous Coal Commission of seven members, the bill provides that two members of the commission "shall have been experienced bituminous coal mine workers, two shall have had previous experience as producers, but none of the members shall have any financial interest, direct or indirect, in the mining, transportation, or sale of, or manufacture of equipment for coal, oil, or gas, or in the generation, transmission or sale of hydro-electric power, or in the manufacture of equipment for the use thereof. No more than two Commissioners shall be residents of any one of the districts hereinafter established." The first Guffey act, nullified by the Supreme Court on May 18, 1936, provided for a five-member board, the second calling for seven members.

Reimposition of the total tax of 15 per cent of the sale price of coal at the mine or the market value if not sold at the mine or "at arms' length" transaction is provided. However, whereas last year's bill imposed a 15 per cent tax and allowed code members a credit of 13½ per cent, the latest version calls for a flat 1½ per cent tax on all coal, with an additional 13½ per cent tax on sales by producers who are not code members.

Marketing Sections Included

Marketing provisions are retained in the latest bill, as in the two preceding measures, and the familiar set-up of 23 district boards is in evidence. Other features retained are the power invested in the Commission to prescribe maximum and minimum prices and prohibition of unfair methods of competition, which are set forth. Regulation of wages and hours of labor, the point on which the Supreme Court based its decision in throwing out the first bill, is stripped from the latest measure, as it was from the preceding one. Collective bargaining without interference by employers is still provided for, however, and the provisions of the Walsh-Healey Act are included in substance in Sec. 9, as follows:

"(b) No bituminous coal shall be purchased by the United States, or by any department or agency thereof, produced at any mine where the producer refuses to accord to his or its employees the rights set forth in subsection (a) of this section [setting forth the right of employees to organize and bargain collectively without restraint, coercion, or interference on the part of the producers].

"(c) Each contract made by the United States, or by any department or agency thereof, with any contractor for a public work, or service or supplies, shall contain a provision that the contractor shall use no bituminous coal on or in the carrying out of said contract unless the producer has accorded to his or its employees the rights set forth in subsection (a) of this section.

"(d) On the complaint of any employee of a producer of bituminous coal, or other interested party, the National Labor Relations Board may hold a hearing to determine whether any producer supplying coal for the use of the United States or any agency thereof or for the use of any contractor on or in the carrying out of any contract subject to the provisions of subsection (c) of this section, is complying with the provisions of subsection (a) of this section. If the Board shall find that such producer is not complying with such provisions, it shall certify its findings to the department or agency concerned. Such department or agency shall thereupon declare the contract for the supply of the coal of such producer or for the work, service, or supply of the contractor using such coal to be canceled and terminated."

Vinson Sponsors House Bill

The Senate measure was referred to the Interstate Commerce Committee. A companion bill (H. R. 2015), introduced in the House by Representative Fred M. Vinson, of Kentucky, was referred to the Committee on Ways and Means. A similar bill (H. R. 2283) has been presented by Representative Charles I. Faddis, of Pennsylvania, and in addition Representative H. C. Ransley, Pennsylvania, has filed Joint Resolution No. 5, along similar lines.

About fifty operators, including the committee named at New York Dec. 17 (*Coal Age*, December, 1936, p. 29) to formulate coal legislation met at White Sulphur Springs, W. Va., on Dec. 29-30 and subsequent meetings were at Washington, D. C., in the following two weeks in an effort to reach an agreement on proposals. A subcommittee of six appointed at White Sulphur Springs to continue efforts to bring about a definite plan consisted of J. D. A. Morrow, president, Pittsburgh Coal Co.; Charles O'Neill, president, United Eastern Coal Sales Corporation; J. D. Francis, president, Island Creek Coal Co.; E. C. Mahan, president, Southern Coal & Coke Co.; W. A. Richards, president, Ashland Coal & Coke Co., and Edwin H. Davis, chairman of board, New York Coal Co.

A large number of suggestions were

forthcoming at the Washington meetings, many of them emphasizing the marketing-agency feature. Since this feature would come nearer leaving actual control of the industry in the hands of the operators, the sponsors of these suggestions received much encouragement, and another subcommittee was named to boil the various suggestions into definite form; the appointees were Hubert Howard, president, Binkley Mining Co. (chairman); H. L. Findlay, vice-president, Youghiogheny & Ohio Coal Co.; L. E. Woods, president, Crystal Block Coal & Coke Co.; R. E. Jamison, vice-president and sales manager, Jamison Coal & Coke Co.; Scott Nichols, vice-president in charge of sales, New River Co.; Jonas Waffle, managing director, Coal Trade Association of Indiana, and M. L. Garvey, Pocahontas Fuel Co.

After meetings throughout the week beginning Jan. 10 a committee of fifteen operators adopted principles around which counsel were requested to draft a proposed bill. These provide for the creation of marketing associations or agencies within the various districts or within contiguous districts, with limitations as to their composition considered desirable, but open to membership by all producers who subscribe to the association constitution and bylaws, which must first be approved by the National Bituminous Coal Commission. Rigid supervision will be exercised over the formation and operation of marketing agencies, approval of the Coal Commission being required.

It is further provided that individual operators not members of such agencies or who fail or refuse to become members shall be subject to all of the provisions of the Guffey act (S 1). Producers who are members of marketing associations, however, shall not be bound by the price provisions of S. 1 except with respect to minor matters concerning differentials on coals in controversy between agencies.

Voluntary Correlation Sought

Selling agencies will be provided with authority to voluntarily correlate prices of coal of their members in common consuming markets. If two agencies are unable to so correlate, then provisions are made for the Coal Commission to act as umpire in settling the differentials. Details of this feature are still to be worked out in drafting the measure. Any agency or association, its officials, members or agents operating under the proposed plan would be exempt from restrictions of the anti-trust acts and the Robinson-Patman Act.

A mid-month poll indicated that the meetings had disclosed that about 25 per cent of the tonnage of the country favored the Guffey plan, whereas approximately 60 per cent preferred a simple marketing provision based on the statement by Congress that the sale of coal below cost (including administration, selling expenses, depreciation and depletion, as well as other costs) is unfair competition, and providing for some form of penalty for violation. The sentiment of the remaining 15 per cent of the tonnage is unknown.

The committee of attorneys expected to formulate the proposed legislation and report at a meeting of the general committee of operators to be held in New York Jan. 25.

In what were said to be well-informed circles it was reported on Dec. 28 that the United Mine Workers were willing to let the operators write the marketing provisions in a new bill. John L. Lewis, president of the union, it was reported, let the producers know that any marketing provisions satisfactory to them would receive full union support if they assured the industry sufficient income to keep up wages.

At the final session of the midwinter meeting of the American Bar Association, held at Columbus, Ohio, Jan. 7, the delegates urged the substitution of regular criminal procedure for the code authority system of enforcing any coal legislation that might be passed by Congress. A report of the association's section on mineral law adopted by the delegates suggested that any federal legislation on coal include provisions that "anyone who knowingly purchases coal sold in violation of the act should be equally guilty with the seller."

FLOOD HITS COAL

SHARP curtailment in coal production for the closing days of January and early February is predicted as a result of flood conditions in the Ohio River valley. While early reports of the disaster do not indicate any great damage to mining operations, except possibly in a few sections, interference with transportation is taking heavy toll. Westbound movement of coal from the Southern fields has been particularly hard hit and little tonnage is expected to cross the Ohio River from West Virginia and Kentucky for a week or ten days. Complaints already are heard of vanishing stocks in the hands of consumers, and these shortages, it is believed, will build up a strong reserve demand for some time to come.

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To Expand Laboratory Work

In order to extend still further its cooperative work with manufacturers of anthracite-burning equipment, Anthracite Industries, Inc., has taken over direction of the Anthracite Laboratory, Primos, Pa. The work which has been done in the laboratory under the direction of the Anthracite Institute will be expanded both in assisting manufacturers in improving present equipment and in bringing out new equipment. Allen Johnson will continue as director of the laboratory.

Curb on Nebraska 'TVA' Extended to Oct. 1

An injunction restricting activities of the PWA in the "little TVA" project in Nebraska, granted to the Iowa-Nebraska Power & Light Co., was extended to Oct. 1 in a formal decree signed Jan. 15 by Justice F. Dickinson Letts of the District of Columbia Supreme Court. The decree modifies the injunction obtained by the company last May and permits the three Nebraska power districts (Platte River, Loup River and Central Nebraska) to proceed with certain construction work but generally confines the work to irrigation purposes. It is understood from the decree, however, that the injunction may be dissolved if the United States Supreme Court rules adversely on the constitutional issues in the case of the Alabama Power & Light Co. and the Iowa Light & Power Co. cases now pending in the District Court of Appeals.

New Preparation Facilities

KINGSTON COAL Co., Kingston, Pa.; contract closed with Wilmot Engineering Co. for addition to present facilities consisting of two Type D Wilmot-Simplex jigs with a capacity of about 50 tons per hour for cleaning chestnut coal.

WESTMORELAND MINING Co., Blairsville, Pa.; contract closed with Roberts & Schaefer Co. for Stump "Air-Flow" plant, Roaring Run mine, for screening and cleaning 2x0-in. coal, separating it into 2x¾-, ¾x¼- and ¼x0-in. sizes; capacity 100 tons per hour.

Sharples Again Wins Prize

The Parent-Teacher Association of Sharples, W. Va., headquarters of the Boone County Coal Corporation, has been awarded the Frankel prize for 1935-36, the second time during the four years since the trophy was established. The award is made each year for the most outstanding piece of community service. First place was taken during the past year by Sharples P.T.A. on the basis of having achieved 99.8 per cent correction of remediable physical defects among its school children, compared with its record of 99 per cent in 1932-33, when it carried off the trophy the first time.

The Sharples Parent-Teacher Association is at the plant of the Boone County Coal Corporation, and the success of its work is due in no small measure to the cooperation of the company. This work received its greatest impetus from the late Col. W. M. Wiley, vice-president in charge of operations of the Boone company, and since his death has been carried on by A. S. Wilson, general manager of the company, with the assistance of Mrs. William J. Clothier, wife of the president.

Program of Intense Interest By A.I.M.E. Coal Division

Mineral economics, health and safety, stream pollution, mechanical loading, preparation, drainage and coal handling are scheduled to receive attention at the Coal Division sessions of the 147th meeting of the A.I.M.E., to be held Feb. 15-18 at the Engineering Societies Building, New York City. The program will include the following papers:

"Outlook for the World Consumption of Metals and Fuels," A. B. Parsons, secretary, A.I.M.E., and Stuart St. Clair, consulting geologist.

"The Competitive Position of Fuels in the United States," H. T. Mann, associate professor of petroleum engineering, Massachusetts Institute of Technology.

"Dust Hazards and Their Control in Mining," Daniel Harrington, chief engineer, safety division, U. S. Bureau of Mines.

"Methods of Sampling and Dust Determination in the Mines of Ontario," George Norman, Department of Mines, Ottawa.

"Physical Aspects of the Silicosis Problem," A. J. Lanza, assistant medical director, Metropolitan Life Insurance Co.

"Method of Handling the Silicosis Problem in Ontario," George C. Bateman.

"Safety Practices of a Large Coal Company."

"National Aspects of the Acid-Mine-Water Problem," Abel Wolman.

"Sources and Chemistry of Acid Mine Waters," R. D. Leitch, associate chemical engineer, U. S. Bureau of Mines.

"Acid-Water-Corrosion Troubles in the Mine and Possible Remedies," M. D. Cooper, general division superintendent, Hillman Coal & Coke Co.

"Effects of Acid Wastes on Public Water Supplies," C. F. Drake.

"Relationship Between Acid Mine Water and Other Forms of Stream Pollution," George L. Hall.

"Extent and Influence of Acid-Mine-Water Pollution in a Typical Mining State (Pennsylvania)," H. P. Drake.

"Acid Mine Drainage as a Part of the National Stream-Pollution Problem," E. S. Tisdale.

"Interest of the Federal Government and the U. S. Public Health Service in Acid-Stream Pollution," R. E. Tarbett.

"Sealing Abandoned Coal Mines as a Public-Works Project, With Methods and Results," E. W. Lyon, Pittsburgh, Pa.; R. V. Whitman, C. E. Ziegler and C. L. Chapman.

"Mechanical Loading in Coal Mines," Paul Weir, Chicago.

"Snow Hill Washery," James Hyslop, mechanical and electrical engineer, Snow Hill Coal Corporation.

"Bulkheads for Coal Mines," John A. Garcia, Allen & Garcia, and S. M. Cassidy, superintendent, Weirton Steel Co. coal mines.

"The Drainage Tunnel of the Pocahontas Fuel Co."

"Theoretical and Practical Aspects of Segregation in the Handling of Coal," D. R. Mitchell, instructor, department of mining engineering, University of Illinois.

"The Oxidation of Pyritic Sulphur in Coal Mines," S. P. Burke, director, industrial science division, West Virginia University, and W. R. Downs.

"Angle of Polarization as an Index of Coal Rank," L. C. McCabe, assistant geologist, Illinois Geological Survey, and T. T. Quirke, professor of geology, University of Illinois.

"Types of Coal," Taisia Stadnichenko, U. S. Geological Survey.

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Personal Notes

DR. LAWRENCE WADE BASS has been appointed a member of the executive staff of the Mellon Institute of Industrial Research, Pittsburgh, Pa. Having served as executive assistant at Mellon Institute during the period 1929-31, Dr. Bass is returning as assistant director after being connected with the Borden Co., New York City, for six years.

W. W. BREWER has been appointed superintendent of Omar No. 5 mine of the West Virginia Coal & Coke Co., Omar, W. Va.

GEORGE P. BROWN has resigned as superintendent of the Edgewater mine of the Tennesee Coal, Iron & Railroad Co., effective Jan. 31, on account of failing health.

L. C. CAMPBELL, general superintendent, Koppers Coal Co., Pittsburgh, Pa., has been appointed chairman of the program committee of the National Safety Council, vice J. W. Alt, resigned. W. G. METZGER, safety director, Hudson Coal Co., has resigned as chairman of the entertainment committee of the mining section, N.S.C.

DENVER B. CORNETT, president, Cornett-Lewis Coal Co., operating in Harlan County, Kentucky, has been elected a director of the Lincoln Bank & Trust Co., Louisville, Ky.

S. C. CRISS has been made foreman of the Frances mine of the Frances Fuel Co., Harrison County, West Virginia.

DAVID DAVIDSON, formerly superintendent of the Springfield mine of the Springfield Coal Corporation, at Nanty Glo, Pa., has been appointed general manager of the Peale operations in Cambria, Clearfield and Indiana counties, Pennsylvania. He succeeds R. J. Protzeller, who has resigned, after fifteen years in the position, to devote all his attention to banking.

JAMES P. DUFFY, for the last seven years advertising manager of the Delaware, Lackawanna & Western Coal Co., has resigned to become assistant to the president of Anthracite Industries, Inc., in charge of advertising and merchandising.

MIKE EVANOFF has been appointed foreman of Osage No. 2 mine of the Osage Coal Co., Osage, W. Va.

EARL W. FISHER, formerly coal freight agent of the Pennsylvania R. R., has been appointed general freight agent by that company.

CARROLL A. GARNER, mining engineer, Jeddo-Highland Coal Co., anthracite producer with operations in Luzerne County, Pennsylvania, has been made general superintendent.

HAROLD P. GREENWALD has been appointed supervising engineer of the Pittsburgh Experiment Station, U. S. Bureau of Mines, vice William P. Yant, resigned. Mr. Greenwald has been in the service of the Bureau since 1914 and has given many years to research in the problems of explosibility of coal dust and mine ventilation. In recording the physical phenomena of large-scale dust-explosion tests in the Experimental mine at Bruceton, Pa., his work included the development of testing methods and recording instruments.

O. V. HAYNES, who acted as night boss during the absence of H. D. McLean, has become face boss in charge of the Seventh South section at Crescent No. 6 mine of the Crescent Mining Co., Peoria, Ill., vice L. O. McElhaney, promoted.

ROY HICKS has been named general foreman of Nos. 1 and 2 mines of the Merrill Coal Mines, Inc., Logan County, West Virginia.

K. F. HUMPHRIES, master mechanic, White Oak division, New River Co., was elected president of the New River and Winding Gulf Electrical and Mechanical Institute in the association's annual election.

CARROLL B. HUNTRESS, president of

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STOKER SALES HOLD GAINS

SALES of mechanical stokers in November last totaled 9,011, according to statistics furnished the U. S. Bureau of the Census by 108 manufacturers. This compares with sales of 18,319 units in the preceding month and 5,004 in November, 1935. Figures for the first eleven months of 1936 show that 79,550 units of all types and sizes were sold, compared with 44,263 in the corresponding period of the preceding year. Sales by classes in the first eleven months of 1936 were as follows: residential (under 100 lb. of coal per hour), 70,814; apartment-house and small commercial heating jobs (100 to 200 lb. per hour), 4,094; general heating and small high-pressure steam plants (200 to 300 lb. per hour), 1,592; large commercial and high-pressure steam plants (over 300 lb. per hour), 3,050.

Appalachian Coals, Inc., until last June, has been appointed assistant to J. Noble Snider, executive vice-president, Consolidation Coal Co., effective Jan. 11. He also was formerly executive secretary of the National Coal Association.

J. A. KERR has been made foreman at the Layland mine of the New River & Pocahontas Consolidated Coal Co., Layland, W. Va.

LOUIS LASALLE has been appointed superintendent of mines of the Colony Coal Co., Dines, Wyo.; R. P. HOGAN has been made chief engineer, and R. C. SMITH has been named assistant superintendent.

W. L. LEGG has been appointed foreman of the Middle Creek mine of the Upper Elk & Potomac Coal Corporation, Bickmore, W. Va.

L. O. MCELHANEY, who was face boss at Crescent No. 6 mine of the Crescent Mining Co., Peoria, Ill., for eight years, has been appointed safety engineer, vice Norman Prudent, promoted.

D. C. MCKEEHAN, chief electrical engineer of the Union Pacific Coal Co., resigned, effective Dec. 31. He will make his home in California for a year at least in an effort to regain his health. He had been connected with the Union Pacific company for eighteen years.

B. PICKELSEIMER has been made superintendent of the Raymond City Coal Co., Raymond City, W. Va.

JUSTIN POTTER, president, Williams Coal Co., was elected president of the West Kentucky Coal Bureau at its annual meeting. J. H. SCHNEIDER, executive vice-president, Dawson Daylight Coal Co., was elected vice-president.

HENRY PRITCHARD has been named foreman of No. 22 mine of the Island Creek Coal Co., Holden, W. Va.

NORMAN PRUDENT, who has been safety engineer at the mines of the Crescent Mining Co., Peoria, Ill., since February, 1934, has been made general superintendent of the mines, succeeding W. P. Young, who is now in active direction of the Bell & Zoller mines.

S. M. REAMS, president, Clear Fork Coal Co., Middlesboro, Ky., has been reelected president of the Middlesboro Chamber of Commerce for his fifth consecutive term.

EDWARD SANDFORD has been appointed general foreman of the Dabney mine of the Hutchinson Coal Co., Kleencoal, W. Va.

JOHN SIROCKMAN has been named foreman of Osage No. 1 mine of the Osage Coal Co., Osage, W. Va.

FRANK SMITH has been promoted from foreman to superintendent of the Rossmore mine of the West Virginia Coal & Coke Corporation, Rossmore, W. Va.

Blank & Stoller

The late F. R. Wadleigh

R. TEMPLETON SMITH has retired from the office of vice-president of the Pittsburgh Coal Co., effective Jan. 1.

WILLIAM J. WILLIAMS, timberman at Crescent No. 6 mine of the Crescent Mining Co., Peoria, Ill., for six years, has been made night boss at Crescent No. 6 mine of the Crescent Mining Co., Peoria, Ill.. vice O. V. Haynes, promoted.

GUY YEAGER has been made foreman of Amigo mine of the Amigo Coal Co., Amigo, W. Va.

WILLIAM G. CAPERTON, president, Scotia Coal & Coke Co., was reelected president of the Smokeless Coal Operators' Association of West Virginia at the annual meeting. All the other officers also were reelected, as follows: first vice-president, R. H. KNODE, president, Stonega Coke & Coal Co.; second vice-president, E. C. PAGE, president, Crozer Coal & Coke Co.; treasurer, H. R. HAWTHORNE, vice-president, Pocahontas Fuel Co.; secretary, HOLLY STOVER.

ARTHUR DOWNING, vice-president and general manager, Monitor Coal & Coke Co., was elected president of the Logan County Coal Operators' Association at its annual meeting. Other officers chosen are: vice-president, LEE OTT, manager of mines, West Virginia Coal & Coke Corporation; treasurer, C. W. JONES, vice-president in charge of operations and general manager, Merrill Coal Mines, Inc.

C. A. PEARSE superintendent, Republic No. 5 mine, Carbon Fuel Co., Kanawha County, West Virginia, was elected president of the Kanawha Valley Coal Mining Institute at the annual meeting. Other officers are: vice-presidents, CAREL ROBINSON, manager of mines, Kellys Creek Colliery Co., and D. W. MARTIN, general superintendent, Wyatt Coal Co.; secretary-treasurer, C. O. MORRIS, West Virginia Department of Mines; assistant secretary-treasurer, W. B. DEVANEY.

F. R. Wadleigh Dies

Francis Rawle Wadleigh, coal consultant and former Federal Fuel Distributor, died Jan. 14 in Alexandria (Va.) Hospital after an illness of more than a year. He was in his seventy-second year.

Born in Muncy, Pa., Mr. Wadleigh was graduated from Princeton University with an A.B. degree in 1883. The same year he became a shop apprentice with the Pennsylvania R.R., becoming a locomotive fireman in 1884. From 1888 to 1897 he was employed in various capacities by the Norfolk & Western Ry., later joining the Chesapeake & Ohio, where he became assistant to the president in 1908. For the next five years he was engaged in engineering work with the Chesapeake & Ohio Coal & Coke Co.

He was in consulting practice in Norfolk, Va., and Philadelphia, Pa., between 1913 and 1917; was chief engineer of the International Coal Products Corporation, 1917-18, and served during the World War with the supply division of the Emergency Fleet Corporation. He became export sales manager and consulting engineer for Weston Dodson & Co. in New York in 1919 and in 1921 was assistant to the president of the Tuttle Corporation. He served as chief of the coal division of the Department of Commerce and commercial engineer of the U. S. Bureau of Mines from 1921 to 1923, resigning in the latter year from active service but remaining in an advisory capacity. Succeeding Conrad E. Spens as Federal Fuel Distributor on Jan. 1, 1923, he supervised the distribution of coal throughout the country.

Subsequently he held important posts in a number of coal companies, being vice-president and general manager, 1924-25, of the Super-Fuel Corporation of New York and a director of the Pittsburgh Terminal Coal Corporation. As a consulting engineer in recent years he served in an advisory capacity to the Consolidated Gas Co. of New York, was president of the Wadleigh Bureau, Inc., became special agent of the Bureau of Foreign and Domestic Commerce in 1931, and was consultant for the Department of the Interior in Alaska from June, 1931, to February, 1932. He left this post to return to private consulting practice.

George L. Carter Passes

George L. Carter, 79, vice-president, Carter Coal Co., operating in McDowell County, West Virginia, died Dec. 30 in Washington of pneumonia. In association with the late Thomas

F. Ryan, he was prominent as a railroad builder as well as an owner of coal properties in Virginia, West Virginia and Tennessee. In 1933 he turned over to his son, James Walter Carter, the presidency of the Carter Coal Co., which held the limelight in instituting the suit that resulted in nullification of the Guffey-Snyder coal control act.

Obituary

CHARLES H. MORRISON, 65, president and general manager of the Odin Coal Co., Centralia, Ill., died Dec. 27 following a heart attack.

LEONARD KENNEDY, 50, president and a director of Carey, Baxter & Kennedy, Inc., coal operators and railroad builders, died Dec. 28 of pneumonia at the United Hospital, Port Chester, N. Y., after a brief illness. The firm carried on extensive stripping operations in the Pennsylvania anthracite fields.

WILLIAM S. RAUSCH, 52, stripping contractor and for many years chief mining engineer for the Lehigh Navigation Coal Co., died Jan. 8 in Lansford, Pa., after a brief illness. He also had been associated with the Philadelphia & Reading Coal & Iron Co. at Pottsville, Pa., for a while.

JOHN T. ARMSTRONG, 63, president of the Ferncliff Coal Co., operating in Armstrong County, Pennsylvania, died Jan. 13 at Brookville, Pa.

A. M. LIVERIGHT, 64, who, during his more than forty years of practice as an attorney, had acted for many years as counsel for central Pennsylvania coal operators, died Jan. 14 of influenza coupled with heart complications. He had been ill about a week, brought about, it is believed, by his immersion in the task of drafting coal legislation.

GEORGE FABER DOWNEY, JR., 40, formerly active in the coal industry, died during the second week in January at his home in Sewickley, Pa. At one time he was a partner in the Landstreet-Downey Coal Co., with mines in the Williamson field of West Virginia.

JOHN T. HOLMES, 92, general manager and purchasing agent of the Webb Coal Mining Co., Garrison, W. Va., died Jan. 7 at Ferndale, W. Va., after an illness of several months. He had been in the coal industry all his life, having active charge of the Webb operations for the last 26 years.

Pierce Firm Name Changed

Announcement is made that, effective Feb. 1, the engineering firm of James H. Pierce & Co., Scranton, Pa., and New York City, will be conducted as a partnership under the name of Pierce Management.

More Stream-Pollution Bills

Stream-pollution bills, which are expected to be numerous at this session of Congress, began making their appearance in the Senate on the opening day, Jan. 6, when two were presented, the first by Senator Lonergan, of Connecticut, a strong advocate of stream-pollution legislation. One bill (S. 13) is an expansive measure providing for federal regulation "to prevent the pollution of the navigable waters of the United States." The second bill (S. 15) would amend Sec. 13 of the Act of March 3, 1899, relating to the deposit of refuse in the navigable waters of the United States, and amend Sec. 3 of the Oil Pollution Act of 1924, making both former acts more drastic.

Senator Barkley and Representative Vinson, both of Kentucky, are sponsors of companion measures (S. 702 and H. R. 2711) which would set up a Division of Water Pollution Control in the Public Health Service. Not as restrictive as the Lonergan bills, these measures provide for action by the federal government only to the extent of surveys of the problem and cooperation with State agencies to bring about gradual elimination of pollution.

Mine Fatality Rate Rises

Coal-mine accidents caused the deaths of 82 bituminous and 15 anthracite miners in November last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 40,615,000 tons, the bituminous death rate in November was 2.02 per million tons, compared with 2.19 in the preceding month, when 43,284,000 tons was mined. The anthracite fatality rate in November last was 3.67, based on an output of 4,090,000 tons, as against 1.41 in the preceding month, when 4,253,000 tons was produced. For the two industries combined, the death rate in November last was 2.17, compared with 2.12 in the preceding month and 2.43 in November, 1935.

Dawson Plans Progressing

Substantial progress in the development of a new mine near Dawson Springs, Ky., has been made by the Dawson Collieries, Inc. (*Coal Age*, July, 1936, p. 300). Construction of the shop buildings, warehouse, tile office, four-track tipple and railroad storage yards has been completed and a 450-ft. 18-deg. slope has been driven to the No. 6 seam, averaging 4 ft. 3 in. in thickness under 125 ft. of cover. Driven through sandstone, shale and limestone, the slope is made with a portal of concrete over an arch of Armco tunnel-steel lining ¼ in. thick on a span of 16 ft.

Entry-development coal at present is brought out by an electric hoist and prepared in a temporary wooden tipple making lump, egg and screenings. When development work has proceeded far enough, a dump and belt conveyor will be installed in the slope. Plans also call for installing mechanical equipment at an early date to place the operation on a fully mechanized basis.

Richard Mine Reopened

Operations were resumed at the Richard mine of the Industrial Collieries Corporation, affiliate of the Bethlehem Steel Corporation, on Jan. 4. The mine, which is at Dellslow, Monongalia County, near Morgantown, W. Va., had been idle since late in 1927. At present about one hundred men are employed, but the number is expected to be increased as conditions justify. The plant is now under the direct supervision of Rex Longridge, until recently night foreman at the company's Barrackville mine.

TVA Appeals Injunction

The Tennessee Valley Authority filed in the Sixth United States Circuit Court of Appeals at Cincinnati, Ohio, on Jan. 8 an appeal from the injunction issued Dec. 14 by Judge John H. Gore, of the Middle Tennessee District Court (January, 1937, *Coal Age*, p. 30). The TVA plea alleged that it would suffer injury if it were prevented from expanding its service. James L. Fly, chief TVA counsel, asserted that Judge Gore lacked jurisdiction in the case, that four of the nineteen complaining companies were estopped from going into court because they obtained power from TVA, and that it was absurd to enjoin the activities of TVA in the belief that its status as a going concern would not suffer by the order. Mr. Fly contended that the complainants should have filed their suit in the Northern District of Alabama, the legal residence of TVA.

A ruling permitting TVA to proceed in Georgia with its power program was made on Jan. 19 by Federal Judge E. Marvin Underwood at Atlanta, Ga., when he granted a temporary order restraining the Georgia Power Co. from enforcing the Gore injunction. Judge Underwood held that TVA had a right to a hearing in the U. S. District Court on the merits of the case, opening the way for TVA to sue for a permanent injunction against interference with its power activities in Georgia.

Irked by legal delays such as the Gore injunction, which he said had virtually paralyzed the TVA program, Senator George W. Norris, of Nebraska, sponsor of the project, urged immediate action by Congress to curb the injunctive processes of federal courts in a statement on Jan. 16.

Stating that the power companies had sought only to delay the consummation of the government's power program, the Nebraska Senator declared that he was not in favor of continua-

tion of discussions for a power pool between TVA and the Commonwealth & Southern. Dr. Arthur E. Morgan, chairman of TVA, issued a statement on the same day in which he proposed a far-reaching program of cooperation between utilities and government power projects to end warfare between the groups. He advised that TVA attempt to find a basis of agreement between TVA and the utility companies "which will protect both public and private investments and will lead to the widest possible distribution of electric power at the lowest possible rates."

Republic Gets Mt. Hope Mine

Negotiations have been completed for acquisition by the Republic Steel Corporation of the Mt. Hope mine, formerly owned and operated by the Brownsville Coal & Coke Co., Brownsville, Pa. Under the new management, operation of the mine will be under the general direction of E. B. Winning, manager of Republic's Northern coal mines. The company also operates coal mines in Alabama. Rated capacity of the Mt. Hope operation, in the Pittsburgh seam, is 1,500 tons per day.

Illinois Autonomy Restored

Autonomy of all local unions in District 12, United Mine Workers (Illinois), has been restored, it was announced on Jan. 7 by O. E. Gasaway, international executive board member. The announcement followed tabulation of the vote on board members and scale committeemen in six of the seven board-member districts, which is the designation that will be used hereafter for subdistricts. Under the new form of government, board members will take office April 1 and a board member will handle the affairs of each district instead of the present subdistrict officers. No election was held in board member district No. 5, consisting of the Gillespie territory and part of the Belleville district, as miners in that territory have not yet come back to the U.M.W., but an election will be held there if the miners there again affiliate with the Lewis union.

Move for Safety in Wyoming

In order to improve safety conditions in that field, the Southern Wyoming Coal Operators' Association has appointed Lyman Fearn as safety engineer. In accordance with a suggestion by Governor Miller that this step be taken, the association named the following committee to make the appointment: W. D. Bryson, manager of operations, Colony Coal Co.; G. A. Knox, superintendent, Gunn-Quealy Coal Co.; T. C. Russell, Diamond Coal & Coke Co. L. W. Mitchell, executive secretary of the association, declared "the safety engineer will, as quickly as possible, inspect each of the mines under his jurisdiction in company with the regular operating officials, formulating a detailed plan for unified effort toward accident reduction. This program will include the closest possible measure of cooperation with the employees of the several properties and the representatives of the miners' unions, who pledged their cordial support toward every reasonable step for the reduction of mine accidents."

Mohawk Operates Again

Mining has been resumed at the Mohawk mine of the Hamilton Coal Mining Co., in Sullivan County, Indiana, after being idle for two months following a fire which caused $100,000 damage. Modern replacements have been provided, according to W. J. Hamilton, general manager, making the plant one of the most up to date in the field. The working force includes 150 miners.

Buchanan Strike Short-Lived

A wage agreement calling for 51.8c. a ton for loaders and 7.8c. for cutters brought to an end on Dec. 30 a strike in the Buchanan County coal field of Virginia which began on Dec. 24. Negotiations were conducted by Van A. Bittner, international representative of the United Mine Workers, and the Upper Buchanan Smokeless Coal Operators' Association after approximately 1,100 had quit work and 700 others threatened to join them. The strikers quit because, they said, their wages were reduced from the District 28 to the District 17 scale. The rate agreed upon in the new scale, according to Bittner, is the same as that paid in the neighboring Williamson field.

Union Opens Harlan Drive

A campaign to unionize the coal miners of Harlan County, Kentucky, was announced on Dec. 30 by the United Mine Workers in a Knoxville (Tenn.) newspaper advertisement. Only about 1,000 men in three mines out of approximately 8,000 miners in the county are now in the union fold, the organization's strength having dwindled following the mine war of 1931. It was in this struggle that the Evarts riot took place, in which three mine guards and one miner were killed.

Organization plans were taken up at a convention at Middlesboro on Jan. 4-5, presided over by William Turnblazer, president, District 19, U.M.W., which includes Harlan. Among other district presidents present were P. T. Fagan, Pittsburgh, Pa.; E. J. Morgan, Madisonville, Ky., and Samuel Caddy, Lexington, Ky. A mass meeting scheduled to be held Jan. 3 at Evarts had to be called off when the county health authorities forbade all public meetings to prevent the spread of cerebro-spinal meningitis, eighteen cases of which had been reported there up to that date.

Industrial Notes

ALLIS-CHALMERS MFG. Co. announces that its subsidiary, the Condit Electrical Mfg. Corporation, Boston, Mass., is being operated as a company unit, known as the Condit Works, beginning Jan. 1. Frank W. Young is works manager; Richard Bechtner, assistant works manager.

LINCOLN ELECTRIC Co., Cleveland, Ohio, announces that Robert Daniels has been placed in charge of the company's Chattanooga (Tenn.) office, 1015 Hanover St.

AMERICAN CHAIN & CABLE Co., INC., became the new name of the old American Chain Co., Inc., effective Dec. 28. The company, which manufactures 137 products, has twelve divisions and associates with nine manufacturing plants and district sales offices scattered across the country.

GENERAL ELECTRIC Co. has elected five new commercial vice-presidents, as follows: M. O. Troy, Schenectady, N. Y., manager, central station department; L. T. Blaisdell, Dallas, Texas, Southwestern district manager; E. H. Ginn, Atlanta, Ga., Southeastern district manager; A. L. Jones, Denver, Colo., Rocky Mountain district manager; T. S. Knight, Boston, Mass., New England district manager.

R. B. HOWLAND, formerly assistant to the president of United Engineers & Constructors, Inc., Philadelphia, Pa., has been elected vice-president and a director.

BROWN-FAYRO Co., Johnstown, Pa., has opened a sales office at 705-6 Union Building, Charleston, W. Va., in charge of O. B. Clark and Murray W. Tuck. Besides handling the complete Brown-Fayro line of mining machinery, Messrs. Clark and Tuck will also represent the Crocker-Wheeler Electric Mfg. Co., Ampere, N. J.

CATERPILLAR TRACTOR Co. has appointed Louis B. Neumiller as sales manager of its central sales division, a new sales area created by dividing the United States into three sales areas instead of two. It includes roughly the territory between the Rocky Mountains and the Mississippi River.

CRANE Co. announces establishment of two new sales districts, East Central and Southeastern, in charge of C. S. Pitkin and J. G. Johns, respectively. Mr. Pitkin, who has been manager of the Pittsburgh (Pa.) branch since 1922, will be succeeded there by H. M. Moss, Pittsburgh sales manager. Mr. Johns, manager at Birmingham, Ala., since 1920, will be succeeded by F. D. Morrison, assistant manager there.